

**CARBON DIOXIDE**

**FIRE EXTINGUISHING  
EQUIPMENT**

**INSTRUCTIONS**

**C-O-TWO FIRE EQUIPMENT CO.**

**NEWARK**

**NEW JERSEY**



EC 86

~~REDACTED~~

393-0091

# C-O-TWO FIRE EXTINGUISHING EQUIPMENT

## INSTRUCTION BOOK

<u>DESCRIPTION</u>	<u>INSTALLATION</u>	<u>OPERATION</u>	<u>MAINTENANCE</u>
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OF

C-O-TWO FIRE SYSTEM

FOR

UNITED STATES NAVY ESCORT VESSELS  
(TYPE TE)

HULL NOS. DE 51-98, 153-161, 198-237, 281-300,  
563-738, 789-800

THE USE OF THIS EQUIPMENT MAY BE REQUIRED AT ANY TIME. IT IS, THEREFORE, IMPORTANT TO KEEP THE APPARATUS IN PERFECT CONDITION AT ALL TIMES.

THESE INSTRUCTIONS SHOULD BE CARRIED OUT IN EVERY DETAIL AND SOMEONE IN CHARGE SHOULD BECOME FULLY FAMILIAR WITH THE EQUIPMENT AND ARRANGE FOR REQUIRED PERIODICAL INSPECTION TO INSURE THE BEST SERVICE AND PROPER OPERATION OF THE SYSTEM.

IF ADDITIONAL INFORMATION OR SERVICE IS REQUIRED, COMMUNICATE WITH THE MANUFACTURER OR FIRMS LISTED IN BACK OF BOOK.



1099

PRINCIPLE

Carbon Dioxide is a dry, non-corrosive inert gas that will not injure machinery, equipment, woodwork, finishes or anything with which it may come in contact. The gas is stored under pressure in steel cylinders in a liquid state. It will not support combustion due to the absence of any free oxygen, and it is this property which is utilized in extinguishing fires. It is a non-conductor of electricity which is an added safety feature when used in combating electrical fires.

One of carbon dioxide's most valuable properties is its high ratio of expansion. When liberated, the gas is discharged by the force of its own expansion and penetrates every nook and corner, even seeking out cracks and crevices where fire might lurk.

Carbon dioxide closely resembles steam as it emerges from the discharge horn. This is due to the moisture in the air being frozen by the extremely low temperature of the gas and the carbon dioxide "snow" accompanying the discharge. This chemical "snow" being 110° below zero F. produces a marked cooling effect when deposited on a burning area in addition to maintaining the gas concentration by giving off carbon dioxide gas as it sublimes.

Carbon dioxide, (not to be confused with carbon monoxide) is not poisonous, but it does not carry oxygen in any form for sustaining human life.

When there is any question as to the amount of carbon dioxide present in a space where fire has been extinguished, it is always desirable to test the atmosphere by inserting a lighted Davy type safety lamp in the space. If the safety lamp continues to burn it indicates that a human may enter with safety. Never test atmospheres by inserting a naked flame, as the possible presence of flammable vapors may result in an explosion.

If necessary to enter a space which contains an excess of carbon dioxide, one may do so for a short period by holding his breath. If necessary to enter for a longer period, use a hose type gas mask or oxygen supply breathing apparatus. Never use cannister type masks for carbon dioxide.

Any person overcome by carbon dioxide should be removed as quickly as possible to a point where plenty of fresh air is available and artificial respiration applied as in the case of drowning.

Normally when using the hose system in a boiler room or large space no danger whatsoever exists to the operator, but the above characteristic of carbon dioxide gas is set forth so that, for example, if a bilge or small paint or locker room is flooded with gas, care will be exercised in entering such spaces until they are completely ventilated.

# C-O-TWO DESIGN

## FIRE EXTINGUISHING SYSTEMS

**APPROVALS.** C-O-TWO design complies with regulations of the Army, Navy, Coast Guard, Maritime Commission, U. S. Bureau of Explosives, Interstate Commerce Commission, Bureau of Standards, Factory Mutual, Underwriters Laboratories, Bureau of Marine Inspection and Navigation and National Board of Fire Underwriters.

**EXTINGUISHING AGENT.** C-O-TWO Systems employ fire's greatest enemy as its extinguishing agent—**CARBON DIOXIDE**—a dry, non-corrosive, inert gas.

Carbon Dioxide extinguishes fire by diluting the oxygen content of a space to a point where it will not support combustion, and aids in extinguishing fire by its cooling effect.

Carbon dioxide will not damage or injure machinery, equipment, woodwork, finishes, fabrics or anything with which it may come in contact. It is a non-conductor of electricity, which is an added safety feature.

One of Carbon Dioxide's most valuable properties is its high ratio of expansion. When liberated, the gas is discharged by the force of its own expansion "without pumping" and penetrates every nook and corner, even seeking out the cracks and crevices where fire might lurk.

In appearance, when discharging, carbon dioxide closely resembles a cloud of steam with this difference: steam is hot while the temperature of carbon dioxide discharging from a C-O-TWO nozzle is approximately 110° F. below zero. The design of C-O-TWO equipment is so proportioned that freezing in the cylinder, valve, hose, piping or at the nozzle is entirely eliminated.

No matter how long cylinders remain unused the gas is just as effective as the day the cylinders were filled as carbon dioxide does not deteriorate.

Carbon dioxide has so many commercial uses, it is available in practically every large city or seaport throughout the world and refills are obtained quickly and conveniently from C-O-TWO Field Agents.

**GENERAL DESCRIPTION.** The C-O-TWO system consists of: one or more steel cylinders filled with liquid carbon dioxide under pressure; a discharge head attached to each cylinder for quickly releasing the contents and a simple piping system terminating with specially designed C-O-TWO discharge nozzles in the protected space.

Several types of manual or automatic releases are available for actuation of C-O-TWO systems. All C-O-TWO systems are arranged for manual operation by local manual control or by remote manual control.

Two or more spaces can be protected with a single system by flooding all spaces simultaneously, or a number of spaces may be protected with one group of cylinders, by use of C-O-TWO direction or selector valves, for direction of gas into the proper space.

**LOCATION OF CYLINDERS—METHOD OF RELEASE.** C-O-TWO cylinders may be installed inside or outside the protected space and it is never necessary to enter the fire area to operate the system.

When cylinders are located in some readily accessible place outside the space they protect they may be released at the cylinder location. This method of release is known as LOCAL CONTROL.

When cylinders are installed inside the space they protect, a REMOTE MANUAL CONTROL is always used. This method of control provides a release for the system from a location safely outside the fire area.

The installation is quite simple and can be made from manufacturer's drawings by any person familiar with ordinary pipe fitting.

**CYLINDERS.** C-O-TWO cylinders are tested and approved in accordance with specifications of the U. S. Bureau of Explosives and Interstate Commerce Commission.

C-O-TWO cylinders are fitted with a forged bronze refillable type valve (Type VC). The valve body is made of highest quality brass forgings and the wall thickness of each valve is sufficient to withstand hydrostatic pressures in excess of 15,000 pounds per square inch.

Each valve has two gold plated metal discs, one is a puncturable sealing disc and the other is a safety disc for releasing pressure from the cylinder in the event of an abnormal rise in pressure. The safety disc will rupture at a pressure of approximately 2900 pounds per square inch, and there is a differential of approximately 1200 pounds between the rupturing value of the two discs, the sealing disc having the highest value.

Sealing disc and safety disc nuts of the valve are made from Tobin bronze, and disc washers are of celeron. A syphon tube inserted in all valves is made from best commercial red brass pipe having a guaranteed copper content of at least 85%.

C-O-TWO cylinders have a protection cover attached to a threaded collar on the neck of each cylinder. This cover entirely encloses and protects the valve and valve threads while in transit. Inside each protection cover is a small brass box in which are stored spare sealing and safety discs with washers and instructions for recharging cylinders.

Serial numbers, full and empty weights, are stamped on the neck of all cylinders. A cylinder record card holder, with record card and a list of recharging stations, is fastened to each cylinder valve.

The greatest care is exercised in testing cylinders, to be sure they are absolutely gas tight, and C-O-TWO cylinders are guaranteed to maintain their full charge without leakage when properly sealed.

**DISCHARGE HEADS.** C-O-TWO pressure operated discharge heads (Type AP-3) provide release means at each cylinder for puncturing the cylinder sealing disc and releasing gas.

C-O-TWO pressure operated discharge heads employ an entirely original arrangement developed by our Company. These heads have but one moving part, the piston assembly with puncturing type cutter. When the piston is moved downward, the cutter punctures the sealing disc of the cylinder and the discharging gas rushes upwards through the hollow cutter above the piston and drives the piston and its cutter downward with a self-energizing effect. This always insures a positive cut of the sealing disc and complete discharge of the cylinder.

With multiple cylinder installations, two "control cylinders" are provided for initial release by manual or automatic means and the pressure of the gas from the initially released "control cylinders" simultaneously discharges all cylinders of the system as a single unit.

C-O-TWO pressure operated discharge heads are made of brass forgings. The aluminum bronze piston forging and stainless steel cutter assembly are one part and easily removed for inspection.

With C-O-TWO the cutter is purposely designed to prevent complete cutting of the cylinder sealing disc and the possibility of the cut portion of a disc clogging in the cutter valve or stopping discharge of gas in piping or nozzles.

The downward travel of a C-O-TWO cutter is limited and it is impossible to force the cutter far enough down to completely cut out the sealing disc. When the disc of a C-O-TWO cylinder is cut, it is hinged by pressure of gas within the cylinder, providing a clear, unrestricted discharge opening.

The following table shows the force exerted by carbon dioxide on the piston and cutter assembly to puncture the frangible sealing disc in the cylinder valve, with cylinder temperatures as follows:

Cylinder Temperature	Force Exerted on Piston
32° F.	1048 pounds
60° F.	1547 "
100° F.	3046 "

The total effective piston area after deducting for stem which is exposed to the atmosphere is 2.08 square inches and the positiveness of operation will at once be apparent when the thickness of the disc to be ruptured is taken into consideration. The disc is only twenty-thousandths (.020) of an inch thick.

A "Knob" on top of each discharge head provides manual control at the cylinder location. All discharge heads have a threaded shoulder for attachment of remote manual control release, or for attachment of protection covers which enclose the "Knob" on top of the discharge head and prevent accidental discharge by contact with falling or passing material.

With multiple systems arranged for "LOCAL MANUAL CONTROL" the discharge heads of two control cylinders are fitted with protection covers of the quick detachable type, and all other discharge heads of the system are fitted with a threaded protection cover of the acorn type.

With remote manual control multiple cylinder systems, two control cylinders are fitted with remote control attachments and all other cylinders are fitted with threaded protection covers of the acorn type.

Chrome finish is standard with C-O-TWO discharge heads.

**DISCHARGE BENDS.** A ½" bronze, extra heavy flexible metallic discharge bend is furnished with each cylinder for connecting the discharge head to the header manifold. C-O-TWO flexible discharge bends show an average rupturing value of approximately 9800 pounds per square inch. The flexible connection eliminates the difficulty experienced with rigid pipe connections or copper loops when installing or replacing cylinders that are not exactly of the same height.

Another advantage is the ease of removing cylinders for weight check or inspection of the discharge head. With C-O-TWO systems it is not necessary to disconnect the flexible discharge bend from the header manifold or discharge head. See **Maintenance** paragraph.

**DISCHARGE NOZZLES.** C-O-TWO nozzles for discharging carbon dioxide are of the correct size and shape to effectively spread the gas without freezing. All nozzles are made of corrosion resisting material.

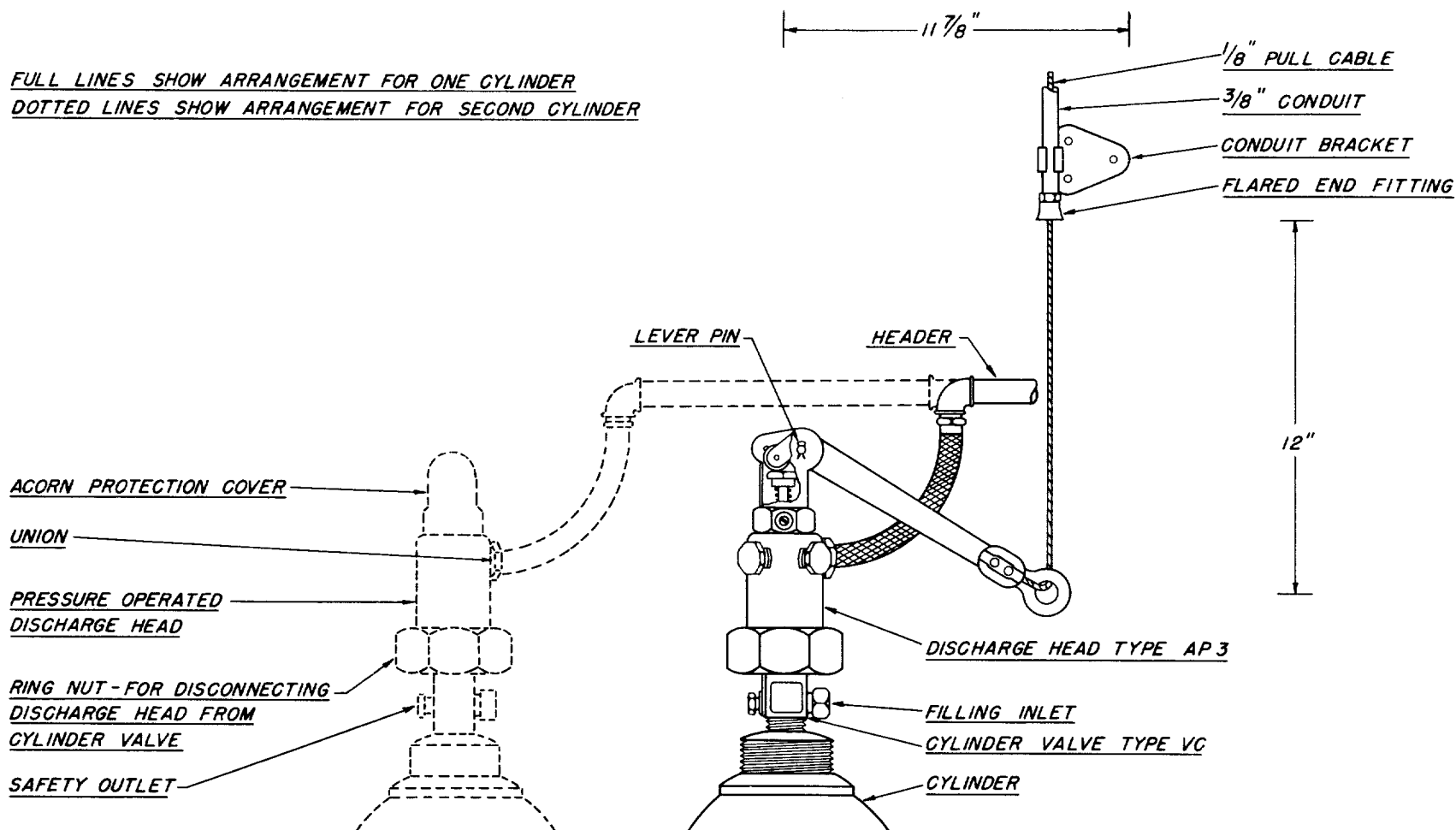
**CYLINDER SUPPORTS.** Malleable iron cylinder saddles with clamps and galvanized bolts, are furnished for securely bracketing cylinders. This arrangement permits the removal of any cylinder without affecting the use of the remaining cylinders of the system in its absence.

**MAINTENANCE.** Periodic weight check of cylinders, inspection of discharge heads and control mechanism is simplified with C-O-TWO systems. Any cylinder can be removed from a system without disconnecting flexible discharge bends, discharge heads or control mechanism, from any permanently installed piping used in connection with the system.

To remove any cylinder, simply unscrew the ring nut coupling connecting the discharge head to the cylinder valve, lift the discharge head off the cylinder, and the head is held by the flexible discharge bend. Then loosen cylinder clamps of cylinder being inspected, and pull out cylinder.

Inspection of discharge heads or control mechanism is made with the cylinder removed, which eliminates any possibility of accidental discharge. This is an exclusive C-O-TWO advantage, and should fire occur during this inspection the system will operate without loss of gas where any cylinder has been removed. The ball check in the discharge head furnishes this safeguard.

FULL LINES SHOW ARRANGEMENT FOR ONE CYLINDER  
DOTTED LINES SHOW ARRANGEMENT FOR SECOND CYLINDER



C-O-TWO  
LOW LEVER RELEASE VERTICAL PULL  
FOR ONE & TWO CYLINDER SYSTEMS

B-60638

NOTE--THE FLEXIBLE METALLIC DISCHARGE BEND CONNECTING THE DISCHARGE HEAD TO THE HEADER MANIFOLD IS PULLED WRENCH-TIGHT FOR PERMANENT INSTALLATION. THE RING NUT CONNECTING THE DISCHARGE HEAD & CYLINDER VALVE IS ASSEMBLED HAND-TIGHT ONLY WITH C-O-TWO IT IS NEVER NECESSARY TO DISCONNECT THE FLEXIBLE METALLIC DISCHARGE BEND FROM THE DISCHARGE HEAD OR HEADER MANIFOLD FOR MAINTENANCE.

PERIODIC WEIGHT INSPECTION OF CYLINDERS & TESTING OF DISCHARGE HEAD CUTTER IS MADE WITH THE DISCHARGE HEAD REMOVED FROM THE CYLINDER. THIS ELIMINATES ANY POSSIBILITY OF ACCIDENTAL DISCHARGE.

TO REMOVE DISCHARGE HEAD, UNSCREW RING NUT COUPLING AND LIFT DISCHARGE HEAD FROM CYLINDER. THE DISCHARGE HEAD IS THEN HELD BY THE FLEXIBLE METALLIC DISCHARGE BEND

THE BALL CHECK OVER THE HOLLOW CUTTER PREVENTS LOSS OF GAS IN EVENT OF FIRE OR SYSTEM OPERATION WHEN THE DISCHARGE HEAD IS REMOVED FROM A CYLINDER OF MULTIPLE CYLINDER SYSTEMS.

VENT PLUGS IN THE DISCHARGE MANIFOLD OR DISCHARGE HEADS OF MULTIPLE CYLINDER SYSTEMS ASSURE PROPER CYLINDER GROUP DISCHARGE

KNOB FOR MANUAL OPERATION  
(FORGED BRASS-CHROMIUM PLATED)

SPRING (STAINLESS STEEL)

THREADED TO ATTACH PROTECTION COVER  
OF THE QUICK DETACHABLE OR ACORN TYPE,  
OR REMOTE MANUAL CONTROL ATTACHMENTS.

BALL CHECK OVER HOLLOW CUTTER  
(STAINLESS STEEL) (SEE NOTE)

PISTON (ALUMINUM BRONZE FORGING)

HOLLOW CUTTER (STAINLESS STEEL)

SEALING DISC NUT  
(BRASS-CHROMIUM PLATED)

SEALING DISC  
(COPPER-GOLD TREATED)

SEALING DISC WASHER  
(CELERON)

SAFETY DISC NUT-RECOIL PREVENTOR  
(BRASS-CHROMIUM PLATED)

CYLINDER VALVE BODY-TYPE VC  
(FORGED BRASS-CHROMIUM PLATED)

CYLINDER

PISTON PACKING

DISCHARGE HEAD BODY-TYPE AP-3  
(FORGED BRASS-CHROMIUM PLATED)

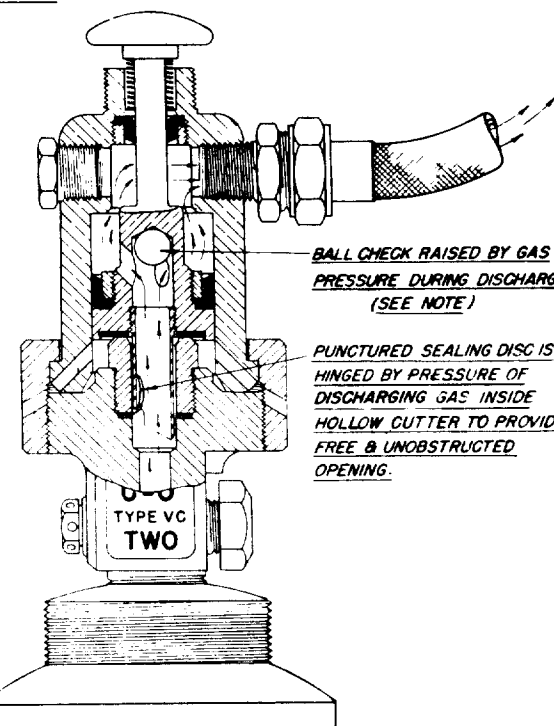
VENT HOLES

RING NUT COUPLING  
(FORGED BRASS-CHROMIUM PLATED)  
(SEE NOTE)

CAP OVER FILLING INLET  
(BRASS-CHROMIUM PLATED)

1/2" FLEXIBLE METALLIC  
DISCHARGE BEND

POSITION OF PISTON & CUTTER  
BEFORE DISCHARGE OF GAS



BALL CHECK RAISED BY GAS  
PRESSURE DURING DISCHARGE  
(SEE NOTE)

PUNCTURED SEALING DISC IS  
HINGED BY PRESSURE OF  
DISCHARGING GAS INSIDE  
HOLLOW CUTTER TO PROVIDE  
FREE & UNOBSTRUCTED  
OPENING.

POSITION OF PISTON & CUTTER  
DURING DISCHARGE OF GAS

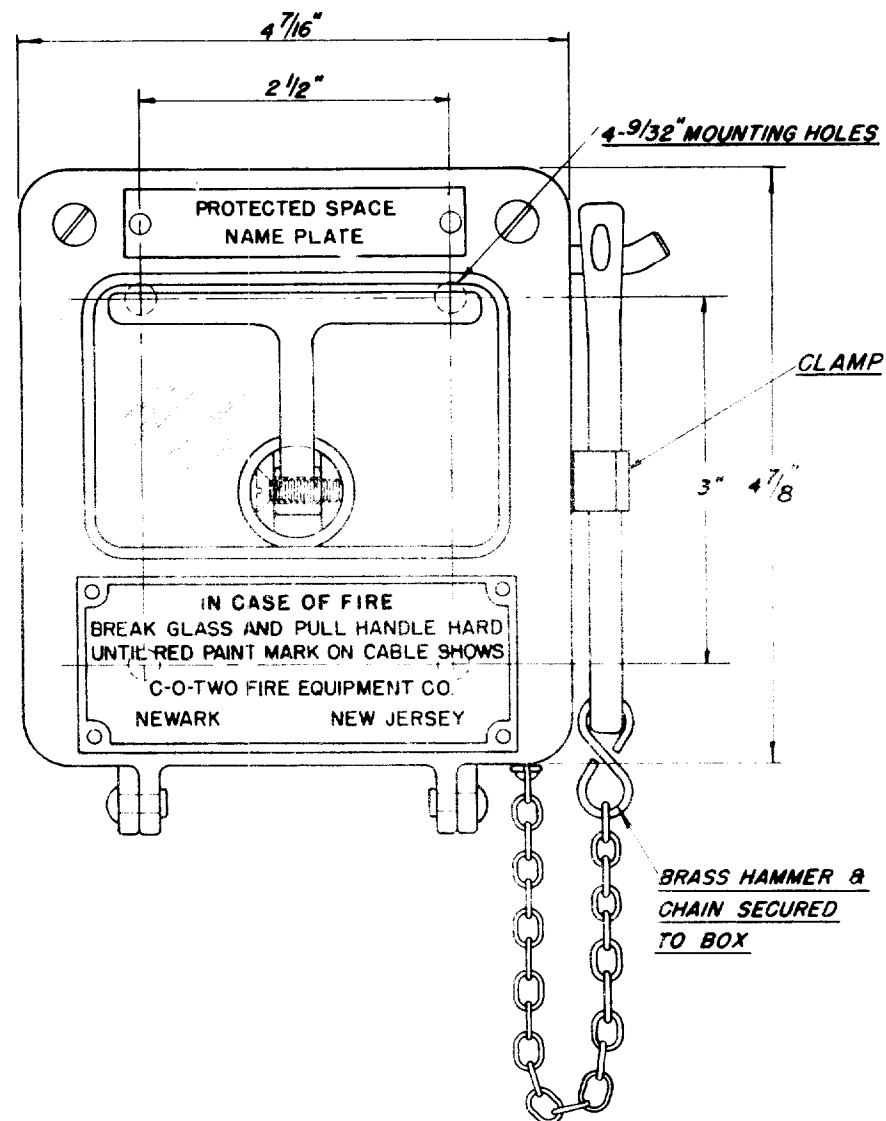
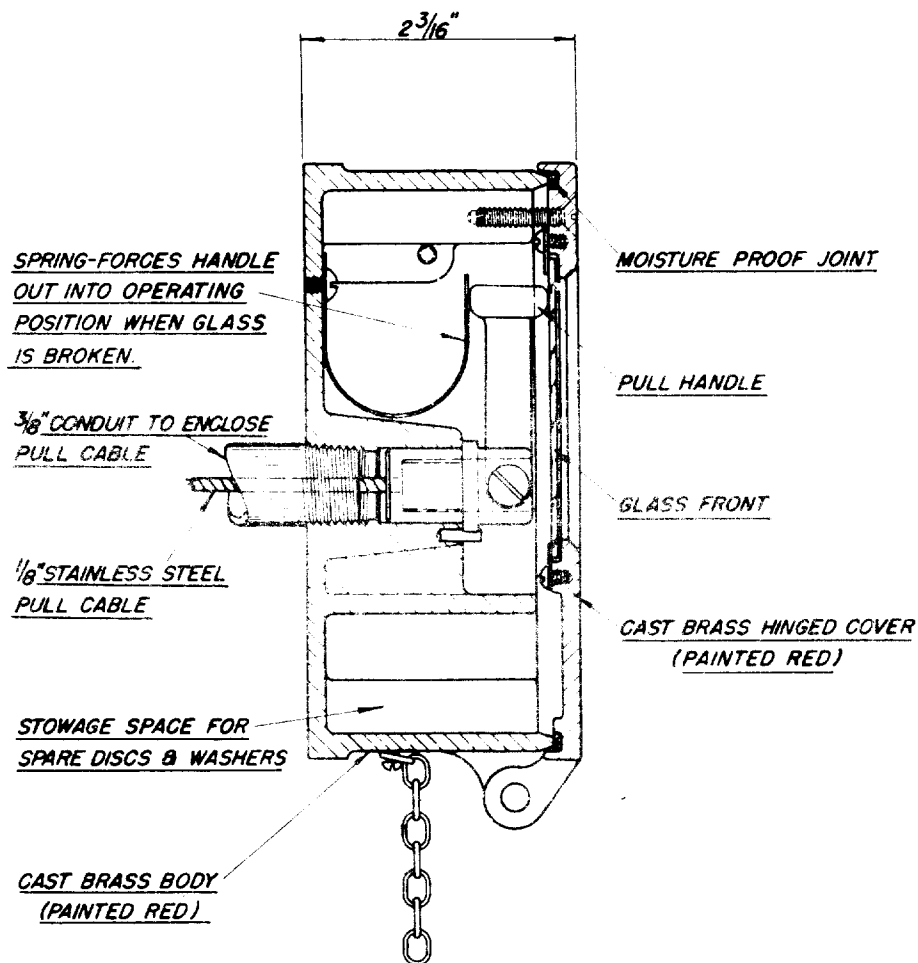
(ARROWS INDICATE FLOW OF DISCHARGING GAS)

## C-O-TWO

### AUTO-PNEUMATIC DISCHARGE HEAD

(PRESSURE OPERATED-TYPE AP-3)

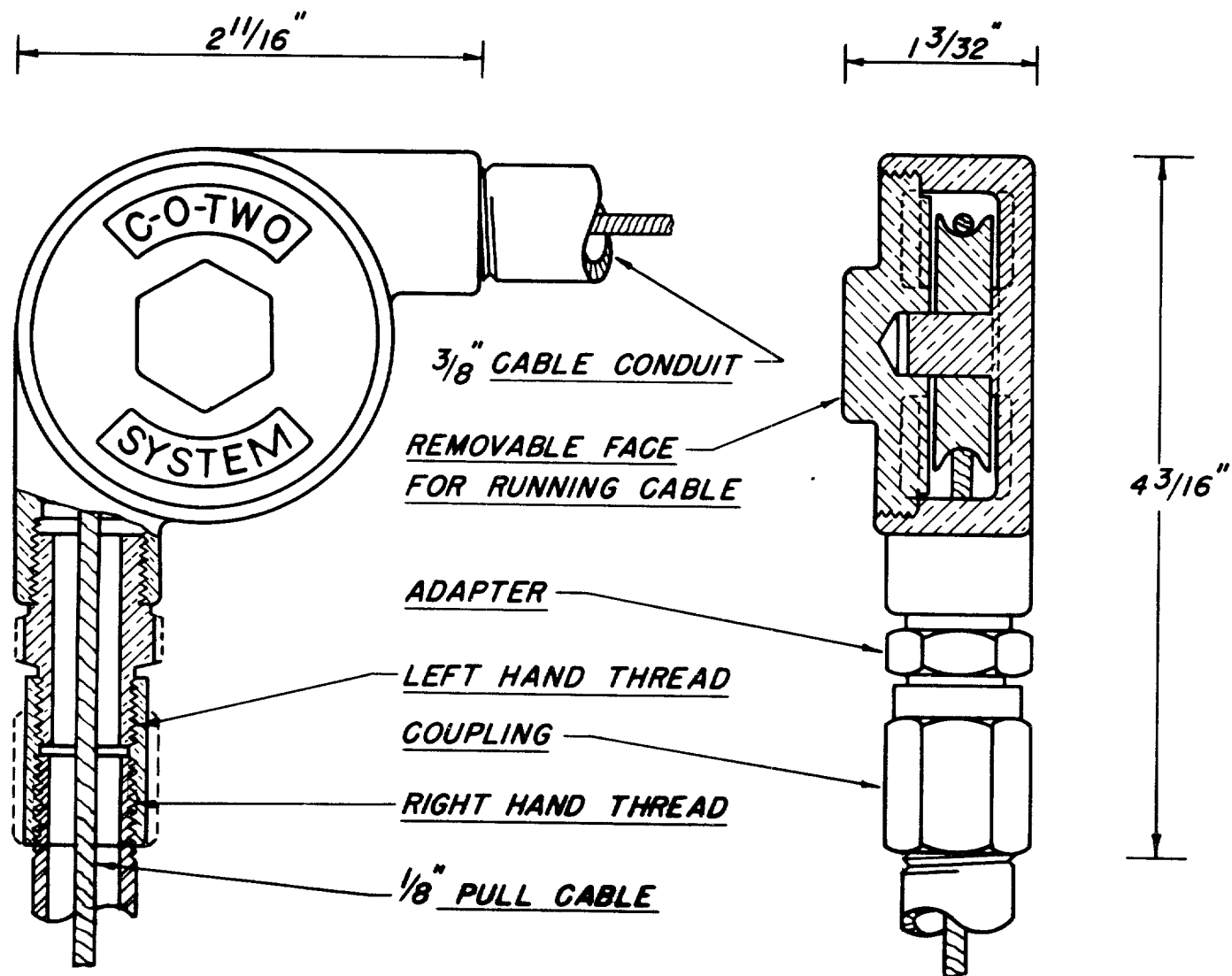
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**C-O-TWO**  
**MANUAL PULL BOX**  
**BREAK GLASS TYPE-FOR SURFACE MOUNTING**

B-60275-1



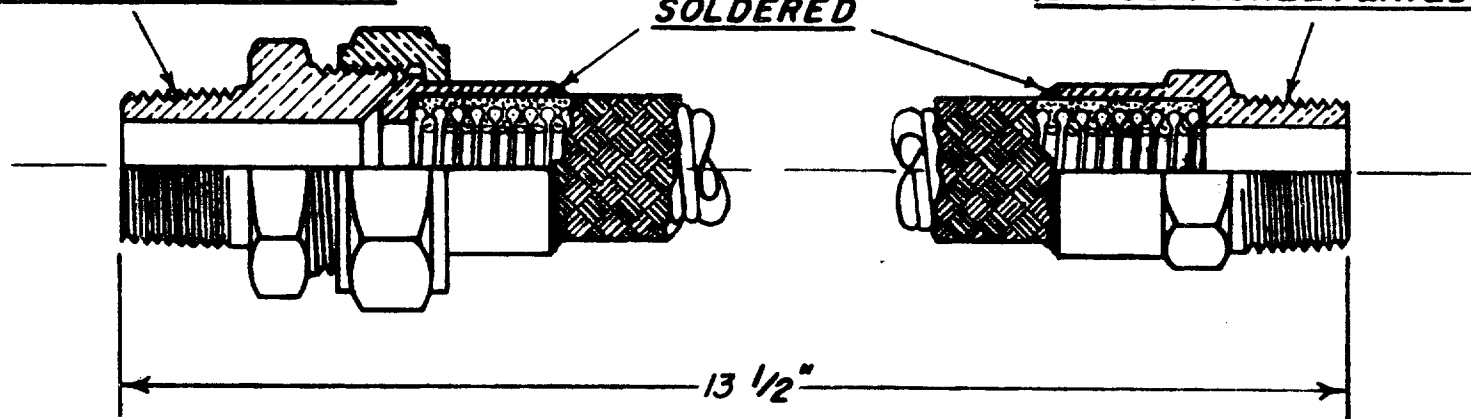


C-O-TWO FORGED BRASS  
WATERTIGHT CORNER PULLEY  
SHEAVE TYPE

1/2" STANDARD PIPE THREAD  
MALE UNION COUPLING  
(BRASS-NICKEL PLATED)

SOLDERED

1/2" STANDARD PIPE THREAD  
MALE COUPLING  
(BRASS-NICKEL PLATED)

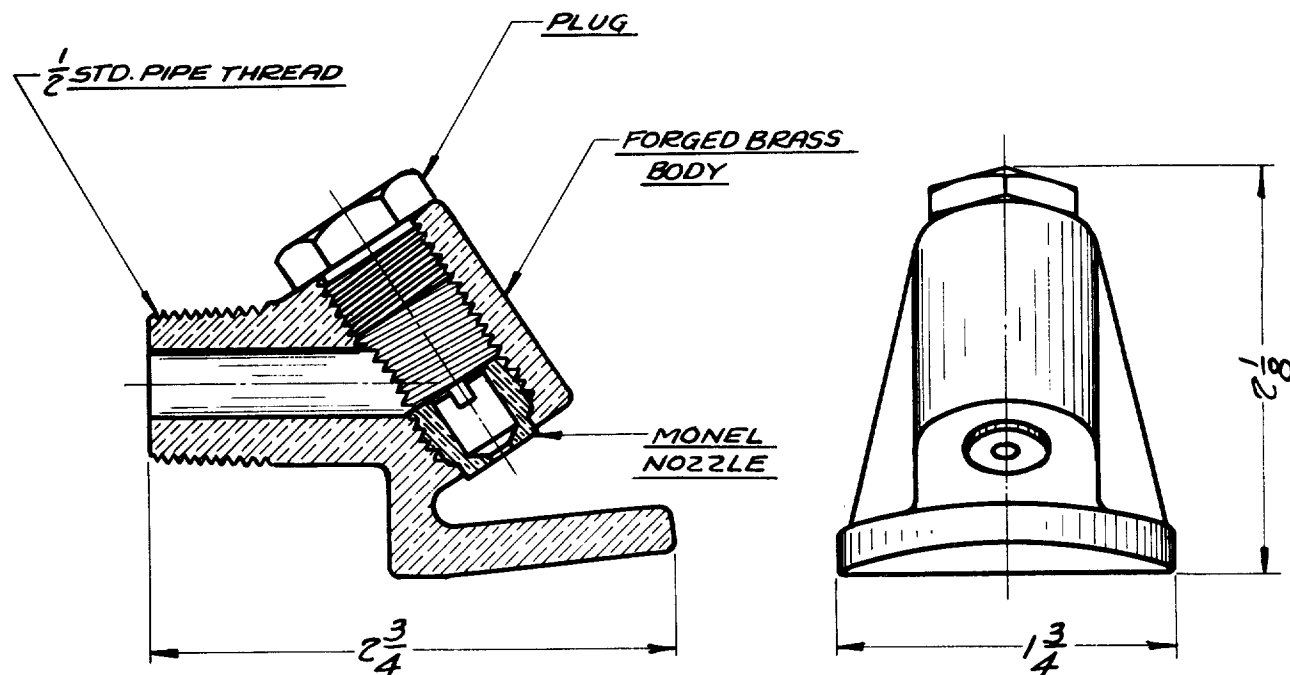


DOUBLE BRAIDED BRONZE SEAMLESS HOSE  $\frac{3}{8}$  I.D.  
(MINIMUM BURSTING PRESSURE 6000 POUNDS PER SQ. IN.)

C-O-TWO

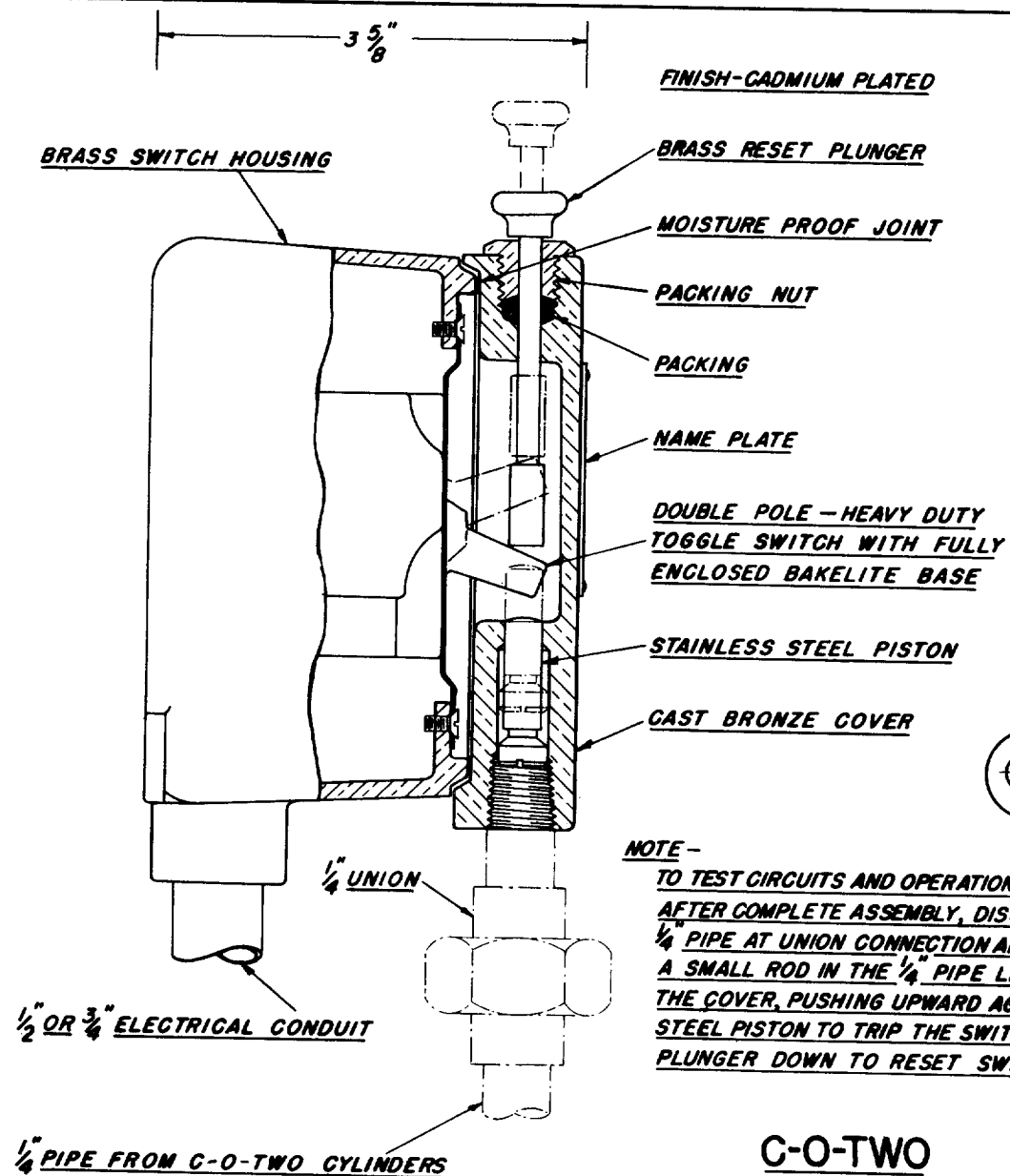
1/2" FLEXIBLE BRONZE DISCHARGE BEND

A-60383-1

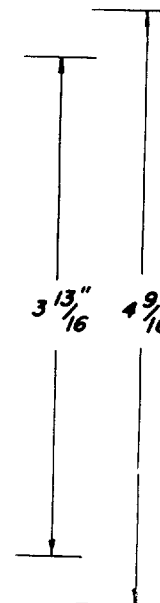
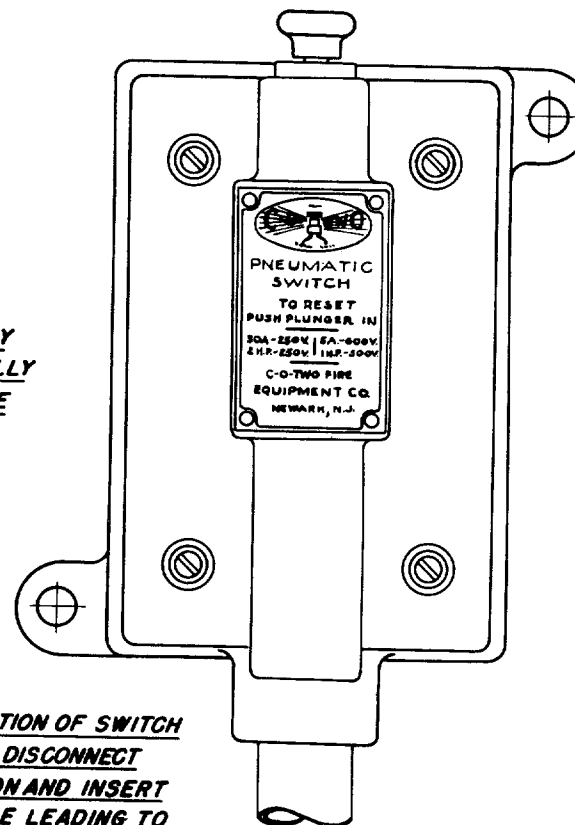


C-O-TWO BAFFLE TYPE DIFFUSING  
NOZZLE

A-60164



**NOTE -**  
 TO TEST CIRCUITS AND OPERATION OF SWITCH AFTER COMPLETE ASSEMBLY, DISCONNECT  $\frac{1}{4}$ " PIPE AT UNION CONNECTION AND INSERT A SMALL ROD IN THE  $\frac{1}{4}$ " PIPE LEADING TO THE COVER, PUSHING UPWARD AGAINST THE STEEL PISTON TO TRIP THE SWITCH. PUSH PLUNGER DOWN TO RESET SWITCH.



# **C-O-TWO PNEUMATIC SWITCH ELECTRIC CIRCUIT OPENER OR CLOSER (WATER-TIGHT TYPE)**

B-60462



## GENERAL INSTRUCTIONS

### REMOTE CONTROL - LEVER TYPE

Cylinder should be installed so that it can be easily removed after use or for weight inspection of cylinder which should be made every six months. (This inspection should never be neglected. See Maintenance Instructions).

Do not install cylinder where it will be exposed to the direct rays of the sun or be subjected to a temperature in excess of 130° F.

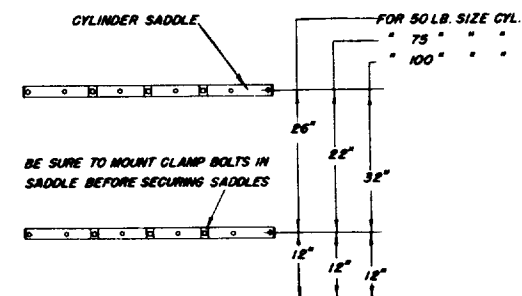
Discharge piping with nozzles should be similarly installed as shown in accompanying layout marked "Typical Installation" and inlet brought to a point convenient for attaching to C-O-Two discharge head with C-O-Two discharge bend. Fasten piping securely. Discharge nozzles should be installed preferably \_\_\_\_\_ inches above the floor. Do not direct nozzles toward companionways, ventilators, windows, hatches, doors or other openings in protected areas. Place pipe strap close to each discharge nozzle. Use extra heavy galvanized or extra heavy brass pipe.

## INSTALLATION INSTRUCTIONS

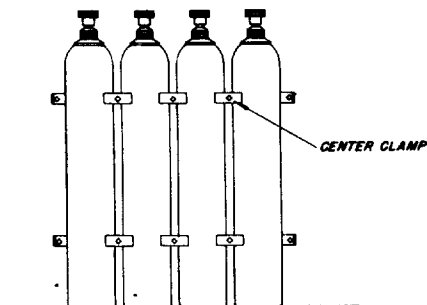
1. Fasten C-O-Two cylinder securely to wall or bulkhead.
2. Remove protection cap from cylinder valve and coat threads of protection cap with light film of grease. Protection cap should then be stored where it can be found at time of recharging.
3. Screw and seat C-O-Two discharge head firmly on cylinder valve. (Before attaching DISCHARGE HEAD to cylinder, see that stem and cutter are free to move downward against supporting spring and that spring holds weight of cutter in its extreme upper position).
4. Connect discharge head to piping, using C-O-Two discharge bend.
5. Install pull cable in conduit using 3/8" galvanized iron or brass pipe.
6. To install cable in cable conduit, unscrew side of C-O-Two corner pulley and pull cable through conduit from pull box to the cylinder. Be sure that cable is in pulley groove before replacing side of corner pulley. Always test for free movement of cable after assembly of controls.

CAUTION: Test with cable disconnected from cylinder discharge head otherwise accidental discharge may result.

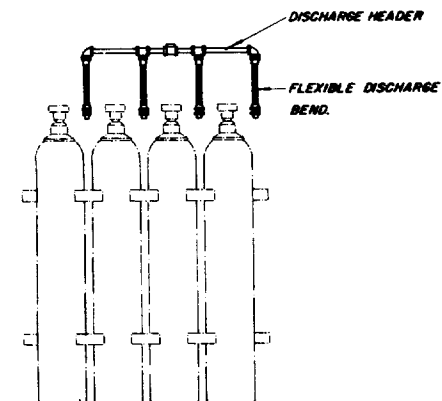
**FIG.1**



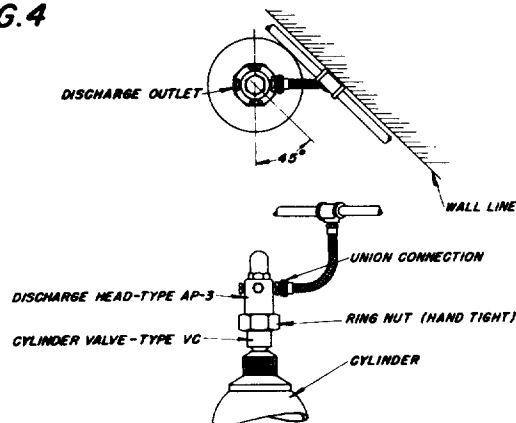
**FIG.2**



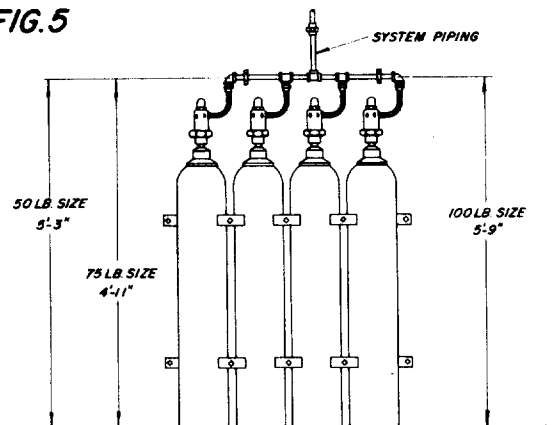
**FIG.3**



**FIG.4**

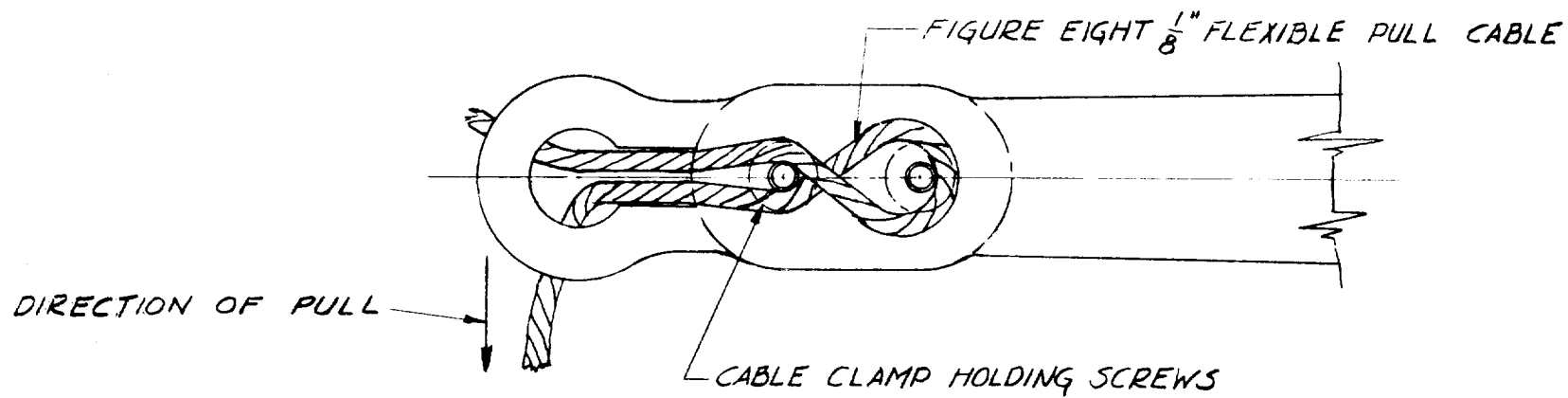


**FIG.5**



- NO.1- FASTEN CYLINDER SADDLES TO WALL IN PROPER POSITION DEPENDING ON SIZE OF CYLINDERS AND ACCORDING TO DIMENSIONS SHOWN ON FIG.1.
- NO.2-STAND CYLINDERS IN POSITION AND CLAMP IN PLACE USING CENTER CLAMPS AS SHOWN ON FIG.2.
- NO.3-SCREW FLEXIBLE DISCHARGE BENDS INTO DISCHARGE HEADER THEN FASTEN HEADER TEMPORARILY IN POSITION AS SHOWN ON FIG.3.
- NO.4-ASSEMBLE DISCHARGE HEADS TO CYLINDER VALVES USING RING NUTS AS SHOWN ON FIG.4. (THESE RING NUTS TO BE HAND TIGHT ONLY). ADJUST DISCHARGE HEADS SO THAT DISCHARGE OUTLETS ARE IN RELATIVE POSITION SHOWN ON FIG.4. FASTEN FLEXIBLE BENDS TO DISCHARGE HEADS USING UNION CONNECTIONS SHOWN ON FIG.4.
- NO.5-ADJUST HEADER SO THAT IT IS APPROXIMATELY AT HEIGHT AND POSITION INDICATED ON FIG.5 AND SO THAT LEAST POSSIBLE STRAIN IS PUT ON FLEXIBLE DISCHARGE BENDS. THEN BRACKET HEADER PERMANENTLY TO WALL AND CONNECT SYSTEM PIPING.

# INSTALLATION INSTRUCTIONS FOR C-O-TWO SYSTEM CYLINDERS



NOTE :

BE SURE THAT THIS METHOD IS  
EMPLOYED WHENEVER A CABLE CLAMP  
IS USED TO SECURE THE CABLE.

METHOD FOR ATTACHING  
CABLE CLAMP TO PULL CABLE

C-O-TWO FIRE EQUIPMENT CO.

NEWARK,

NEW JERSEY

DATE 10-18-40

APPROVED

*[Signature]*

DRAWING NUMBER

RE-  
DWN. D.A.D. CH'KD

SCALE FULL

A-60304

## C-O-TWO EQUIPMENT

QUANTITIES ARE FOR ONE SWIP			
PC NO	NAME OF PART	QUANTITY	UNIT
1	SOIL SIZE 5.0-TWO CR.	8	Y
2	DISCHARGE HEAD (STYAL)	1	5
3	SHIELD MANO LINE RELAY	1	5
4	SHIELD LINE FOR RETAIL REL	1	5
5	CRACKER WIRE THE NC	8	Y
6	W FLEXIBLE RICH BLEND	8	Y
7	1/8 CABLE	1	5
8	BRASS GLASS RUL DOG	1	5
9	CONCRETE DULLEY	1	5
10	STANDER BEHART	1	5
11	CRACKER STRAP	1	5
12	FLARED AND FITTING	1	5
13	LEVER GARD	1	5
14	5 INSTRUCTION PLATE (H)	1	5
15	1/2 STOP VALVE	1	5
16	1/2 STOP VALVE	1	5
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80	1/2 STOP VALVE	1	5
81	1/2 STOP VALVE	1	5
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90	1/2 STOP VALVE	1	5
91	1/2 STOP VALVE	1	5
92	1/2 STOP VALVE	1	5
93	1/2 STOP VALVE	1	5
94	1/2 STOP VALVE	1	5
95	1/2 STOP VALVE	1	5
96	1/2 STOP VALVE	1	5
97	1/2 STOP VALVE	1	5
98	1/2 STOP VALVE	1	5

TEAM 1 - NOISE RELIEF 5/3/76 AM 3  
TEAM 2 - BUNK ROOM & ALCOHOL 6/25/76

CLINDONES FOR MORE FEEL SYSTEM FILLED WITH 5-A. CO.  
SUEMATIC SWITCH TO STOP PAN MOTOR CONNECT WITH  
10-PIED TO C.D. TWO BIDDING NUMBER SHOWN  
DO NOT VOLTAGE SEE DRAWING 10-00000-2

## CO<sub>2</sub> GAS REQUIREMENTS

VOLUME OF PAINT ROOM 14.6 GALLONS. 792 CUBIC FT.  
NO. 100. 20 LBS CO. OF 1-50 LBS SIZE. 5.0 TWO CYLINDERS.

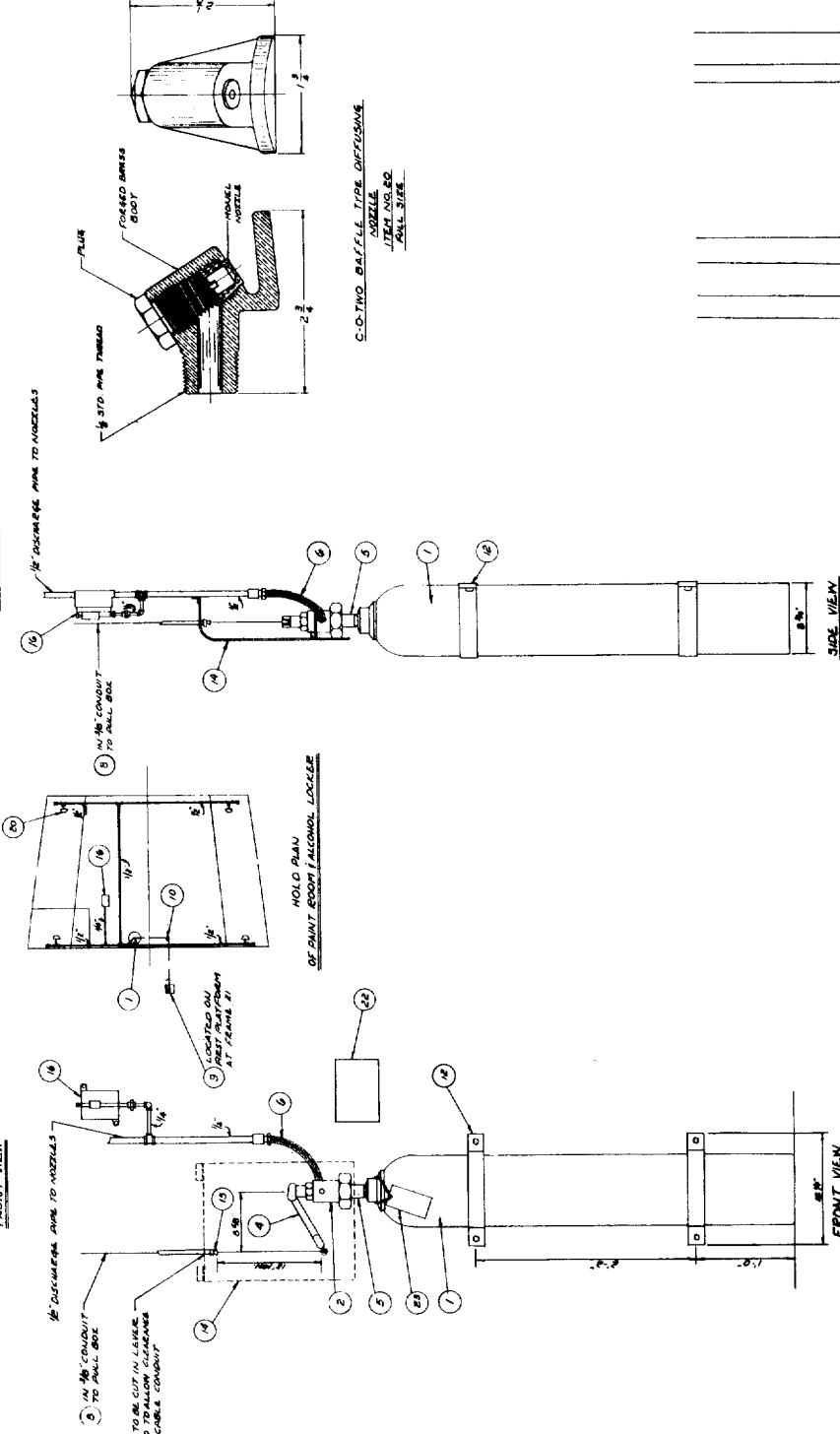
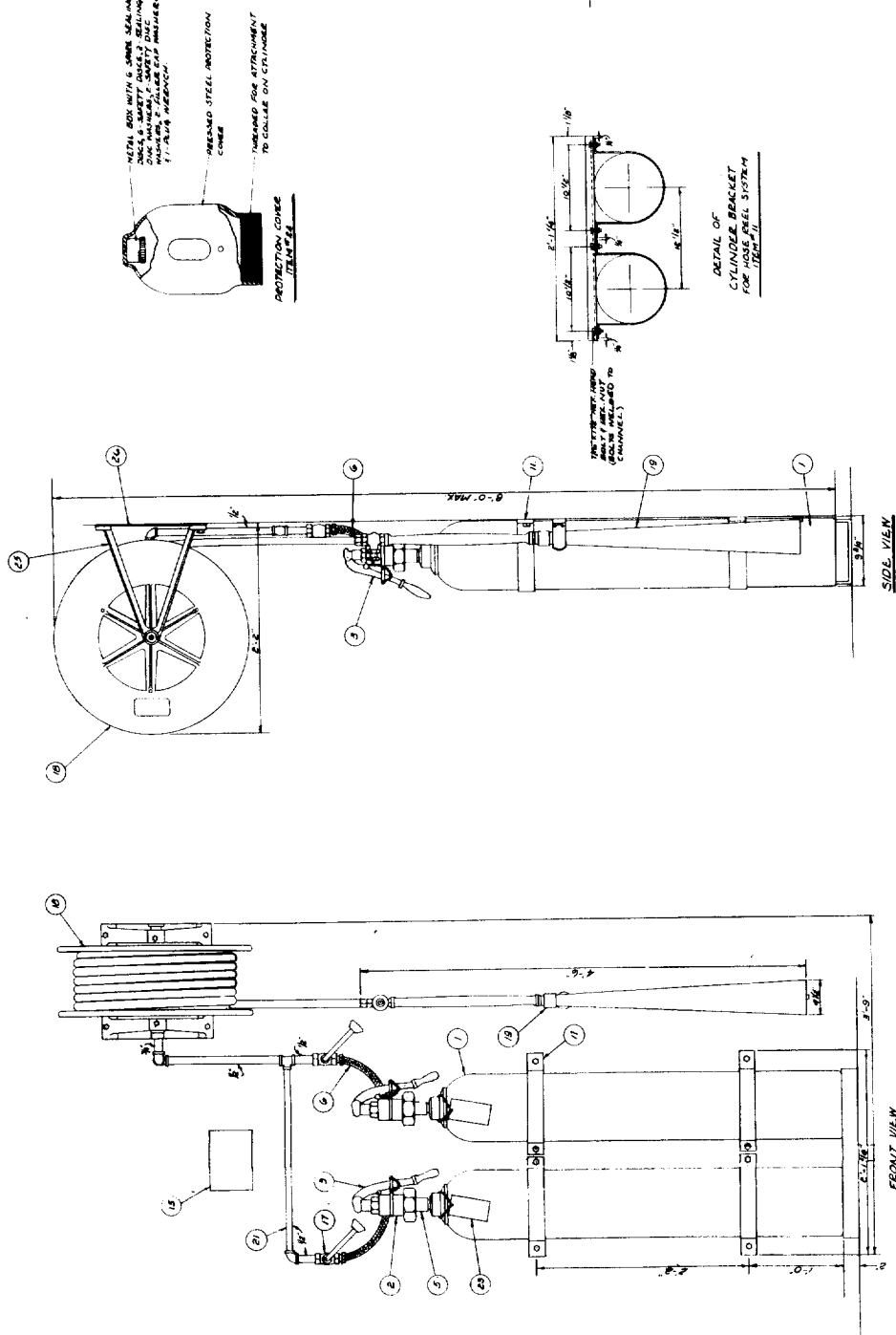
THE AMOUNT OF CO<sub>2</sub> SHALL BE SUFFICIENT TO RISE A FLAME CONCEN-

TEATION OF CO<sub>2</sub> GAS OF NOT LESS THAN 85%.

RATE OF DISCHARGE OF CO<sub>2</sub> THROUGH 4.5 GRABBLE TYPE NOZZLES 3/3  
APPROXIMATELY 100 LBS PER MINUTE.

THE UNIVERSITY OF CHICAGO PRESS

BA LEVEL 1 DESIGNATED TO SUPPORT A UNIT LOAD OF 800 LBS. FOR COLUMNS TO BE MOUNTED ON FOUNDATION 2 AND 3.



U.S. NAVY	BUREAU OF SHIPS PLAN NUMBER	513411 DE51 S93
DATE APPRO. OFFICE	DON'T APPL.	

EEAGENS  
BY DIRECTION  
CLARENCE DINGLES

PLAN

EXAMINED AND FOUND CORRECT

DATE \_\_\_\_\_ SUPERVISOR OF SHIPBUILDING U \_\_\_\_\_

C-O-TWO FIVE EXTINGUISHING

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

SYSTEM DETAILS

ESCORT VESSELS DE 51 CLASS

115 NAVY

	SUBJECT OF STUDY OR AN NUMBER
--	-------------------------------

		BUREAU OF SHIPS PLAN NUMBER	E 1241 DEE 1003
--	--	-----------------------------	-----------------



## PIPING NOTES FOR GALVANIZED STEEL PIPE

(THESE SPECIFICATIONS TO APPLY TO ALL INSTALLATIONS OF C-O-TWO FIRE EXTINGUISHING SYSTEMS)

1. ALL PIPE UP TO AND INCLUDING 3/4" SIZE TO BE STD.WGT.GALV.STEEL.
2. ALL PIPE OVER 3/4" SIZE TO BE EXTRA HEAVY GALV. STEEL.
3. ALL FITTINGS TO BE EXTRA HEAVY GALV. MALLEABLE IRON OR STEEL.
4. CYLINDERS AND PIPE TO BE SECURELY BRACKETED - ESPECIALLY AT FITTINGS AND NOZZLES.
5. REAM, CLEAN AND BLOW OUT ALL PIPE BEFORE INSTALLING.
6. ALL DEAD END PIPE LINES TO BE PROVIDED WITH A 1/2" CAPPED NIPPLE, 2" LONG.
7. AFTER ASSEMBLY, BLOW OUT ENTIRE PIPE SYSTEM BEFORE INSTALLING DISCHARGE NOZZLES.
8. 1/8" PULL CABLE TO BE RUN IN 3/8" STD.WEIGHT GALV. STEEL PIPE.
9. USE C-O-TWO CORNER PULLEYS AT ALL CHANGES IN DIRECTION IN 3/8" PIPE USED FOR CONDUCTING PULL CABLE. BENDS OR OFFSETS WILL NOT BE ACCEPTABLE.

## C-O-TWO SYSTEM - REMOTE CONTROL TYPE

### MAINTENANCE INSTRUCTIONS

After the system has been installed six months, and every six months thereafter, the following inspection should be made:

1. CHECK WEIGHT OF EACH CYLINDER.

- A. Remove levers on discharge heads of control cylinders by removing lever pins--Do not disconnect cable from lever or replace levers until all inspections have been completed.
- B. Unscrew coupling nut connecting the discharge head to cylinder valve and then lift head off cylinder. See that cutter is in uppermost position and in good condition.
- C. Loosen cylinder clamps of cylinder being inspected and pull out cylinder for weight check. If total weight of cylinder is less than the full weight stamped on cylinder check the loss of weight in following table. If the loss of weight is greater than that shown below, recharge cylinder immediately.

Cylinder size	10	15	20	25	35	50	75	100
Allowable loss in pounds	1	1.5	2	2.5	3.5	5	7.5	10

- D. Replace cylinder being inspected and attach discharge head hand tight only. Remove only one cylinder at a time for weight check.

2. TEST REMOTE PULL CONTROL.

- A. Make sure levers have not been replaced on discharge heads of cylinders.
- B. Open pull box and pull handle to see that cable in conduit has a free movement.
- C. Return cable to reset position and close pull box.
- D. Replace levers in reset position and discharge heads of control cylinders.

3. INSPECT PIPING TO SEE THAT PIPING AND DISCHARGE NOZZLES ARE IN GOOD CONDITION AND SECURELY BRACKETED.

\* \* \* \* \*

Protect cylinders from corrosion by keeping them well painted at all times

When necessary to refill cylinder, attach protection cover to cylinder valves and return to manufacturer, nearest agent, or to nearest carbon dioxide manufacturer's recharging plant.

SHOULD FIRE OCCUR WITH ANY SINGLE CYLINDER REMOVED FROM A MULTIPLE CYLINDER SYSTEM DURING WEIGHT INSPECTION OF CYLINDERS, THE SYSTEM CAN BE USED WITHOUT LOSS OF GAS. THE BALL CHECK IN THE DISCHARGE HEAD PROVIDES THIS SAFEGUARD.

# C-O-TWO FIRE EXTINGUISHING EQUIPMENT

## INSTRUCTION BOOK

DESCRIPTION

INSTALLATION

OPERATION

MAINTENANCE

OF

C-O-TWO HOSE REEL SYSTEM

LOCAL CONTROL TYPE

THE USE OF THIS EQUIPMENT MAY BE REQUIRED AT ANY TIME. IT IS, THEREFORE, IMPORTANT TO KEEP THE APPARATUS IN PERFECT CONDITION AT ALL TIMES.

THESE INSTRUCTIONS SHOULD BE CARRIED OUT IN EVERY DETAIL AND SOMEONE IN CHARGE SHOULD BECOME FULLY FAMILIAR WITH THE EQUIPMENT AND ARRANGE FOR REQUIRED PERIODICAL INSPECTION TO INSURE THE BEST SERVICE AND PROPER OPERATION OF THE SYSTEM.

IF ADDITIONAL INFORMATION OR SERVICE IS REQUIRED, COMMUNICATE WITH THE MANUFACTURER OR FIRMS LISTED IN BACK OF BOOK.



C-O-TWO FIRE EXTINGUISHING EQUIPMENT

PRINCIPLE

CARBON DIOXIDE IS A DRY, NON-CORROSIVE INERT GAS THAT WILL NOT INJURE MACHINERY, EQUIPMENT, WOODWORK, FINISHES OR ANYTHING WITH WHICH IT MAY COME IN CONTACT. THE GAS IS STORED UNDER PRESSURE IN STEEL CYLINDERS IN A LIQUID STATE. IT WILL NOT SUPPORT COMBUSTION DUE TO THE ABSENCE OF ANY FREE OXYGEN, AND IT IS THIS PROPERTY WHICH IS UTILIZED IN EXTINGUISHING FIRES. IT IS A NON-CONDUCTOR OF ELECTRICITY WHICH IS AN ADDED SAFETY FEATURE WHEN USED IN COMBATING ELECTRICAL FIRES.

ONE OF CARBON DIOXIDE'S MOST VALUABLE PROPERTIES IS ITS HIGH RATIO OF EXPANSION. WHEN LIBERATED, THE GAS IS DISCHARGED BY THE FORCE OF ITS OWN EXPANSION AND PENETRATES EVERY NOOK AND CORNER, EVEN SEEKING OUT CRACKS AND CREVICES WHERE FIRE MIGHT LURK.

CARBON DIOXIDE CLOSELY RESEMBLES STEAM AS IT EMERGES FROM THE DISCHARGE HORN. THIS IS DUE TO THE MOISTURE IN THE AIR BEING FROZEN BY THE EXTREMELY LOW TEMPERATURE OF THE GAS AND THE CARBON DIOXIDE "SNOW" ACCOMPANYING THE DISCHARGE. THIS CHEMICAL "SNOW" BEING 110° BELOW ZERO F. PRODUCES A COOLING EFFECT WHEN DEPOSITED ON A BURNING AREA AND GIVES OFF CARBON DIOXIDE GAS AS IT SUBLIMES.

CARBON DIOXIDE, (NOT TO BE CONFUSED WITH CARBON MONOXIDE) IS NOT POISONOUS, BUT IT DOES NOT CARRY OXYGEN IN ANY FORM FOR SUSTAINING HUMAN LIFE.

NORMALLY, WHEN USING THE HOSE SYSTEM IN A BOILER ROOM OR LARGE SPACE, NO DANGER WHATSOEVER EXISTS TO THE OPERATOR, BUT IF A BILGE, PAINT ROOM OR SMALL SPACE IS FLOODED WITH THE GAS, CARE SHOULD BE EXERCISED IN ENTERING SUCH SPACES UNTIL THEY ARE COMPLETELY VENTILATED.

WHEN THERE IS ANY QUESTION AS TO THE AMOUNT OF CARBON DIOXIDE PRESENT IN A SPACE WHERE FIRE HAS BEEN EXTINGUISHED, IT IS ALWAYS DESIRABLE TO TEST THE ATMOSPHERE BY INSERTING A LIGHTED DAVY TYPE SAFETY LAMP IN THE SPACE. IF THE SAFETY LAMP CONTINUES TO BURN, IT INDICATES THAT A HUMAN MAY ENTER WITH SAFETY. NEVER TEST ATMOSPHERES BY INSERTING A NAKED FLAME, AS THE POSSIBLE PRESENCE OF FLAMMABLE VAPORS MAY RESULT IN AN EXPLOSION.

IF NECESSARY TO ENTER A SPACE WHICH CONTAINS AN EXCESS OF CARBON DIOXIDE, ONE MAY DO SO FOR A SHORT PERIOD BY HOLDING HIS BREATH. IF NECESSARY TO ENTER FOR A LONGER PERIOD, USE A HOSE TYPE GAS MASK OR OXYGEN SUPPLY BREATHING APPARATUS. NEVER USE CANNISTER TYPE MASKS FOR CARBON DIOXIDE.

ANY PERSON OVERCOME BY CARBON DIOXIDE SHOULD BE REMOVED AS QUICKLY AS POSSIBLE TO A POINT WHERE PLENTY OF FRESH AIR IS AVAILABLE AND ARTIFICIAL RESPIRATION APPLIED AS IN THE CASE OF DROWNING.



LOCAL CONTROL TYPEGENERAL DESCRIPTION

The C-O-Two Hose System consists of the following parts:

1. One or more cylinders, each containing 50 lbs. of carbon dioxide. Cylinders are sealed with a gold plated metal disc, and the cylinder valve has a side safety disc for pressure relief.
2. Cylinder saddles, clamps and bolts for bracketing the cylinders.
3. A discharge head attached to each cylinder. Inside the head is a hollow cutter for quick release of the carbon dioxide in the cylinder.
4. Each Discharge Head is fitted with a manual lever for discharging the cylinder. The lever is held down by means of a locking pin which is in turn held in place by a lead and wire seal.
5. A discharge bend connection between each discharge head and header manifold.
6. A normally closed stop valve for each cylinder in the header manifold. If the discharge of one cylinder is desired, the stop valve over the cylinder must be opened before the cylinder is released. If both stop valves are open, discharging one cylinder will simultaneously discharge the other.
7. Piping from the header manifold to a hose reel or hose rack; high pressure hose, and combination discharge horn and control valve completes the unit.

GALVANIZED IRON DRUM

BRASS ELBOW

BRASS COUPLING WITH RIGHT  
& LEFT HAND THREAD

BRASS SIDE FLANGES

BRASS PIPE NIPPLE (EXTRA HEAVY)

BRASS THRUST BUSHING

ASBESTOS GRAPHITE PACKING

BRASS GLAND

THREE (3) STEEL CAP  
SCREWS PROVIDE BRAKE  
ADJUSTMENT

BRASS TEE

MALLEABLE IRON BRACKET

STEEL TIE ROD

BOILER STEEL BACK PLATE

HOSE REEL WIDTH DIMENSION "A"	
0 TO 100 FT. LENGTH $\frac{1}{2}$ " HOSE	- 14 $\frac{1}{4}$ " WIDE
0 TO 50 FT. LENGTH $\frac{3}{4}$ " HOSE	- 14 $\frac{1}{4}$ " WIDE
51 TO 100 FT. LENGTH $\frac{3}{4}$ " HOSE	- 20 $\frac{1}{4}$ " WIDE
101 TO 150 FT. LENGTH $\frac{3}{4}$ " HOSE	- 24 $\frac{1}{4}$ " WIDE
151 TO 200 FT. LENGTH $\frac{3}{4}$ " HOSE	- 28 $\frac{1}{4}$ " WIDE

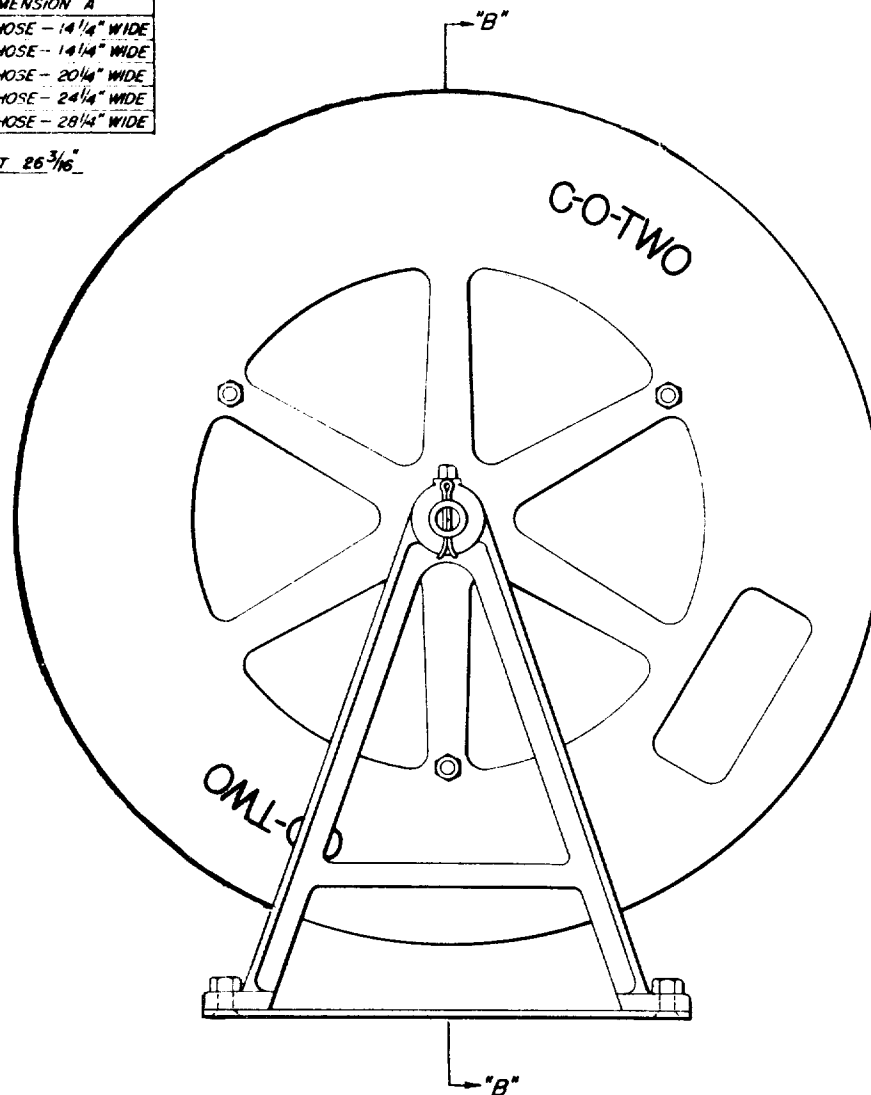
OVERALL HEIGHT 26  $\frac{3}{16}$ "

BRASS SHAFT

STEEL SET SCREW

BRONZE BUSHING

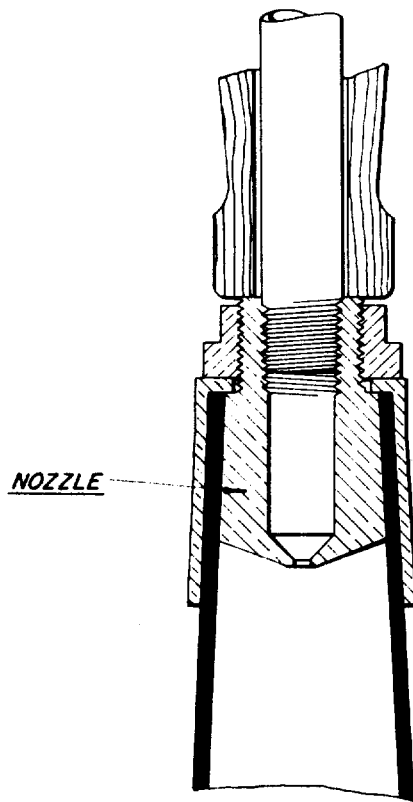
SECTION "B-B"



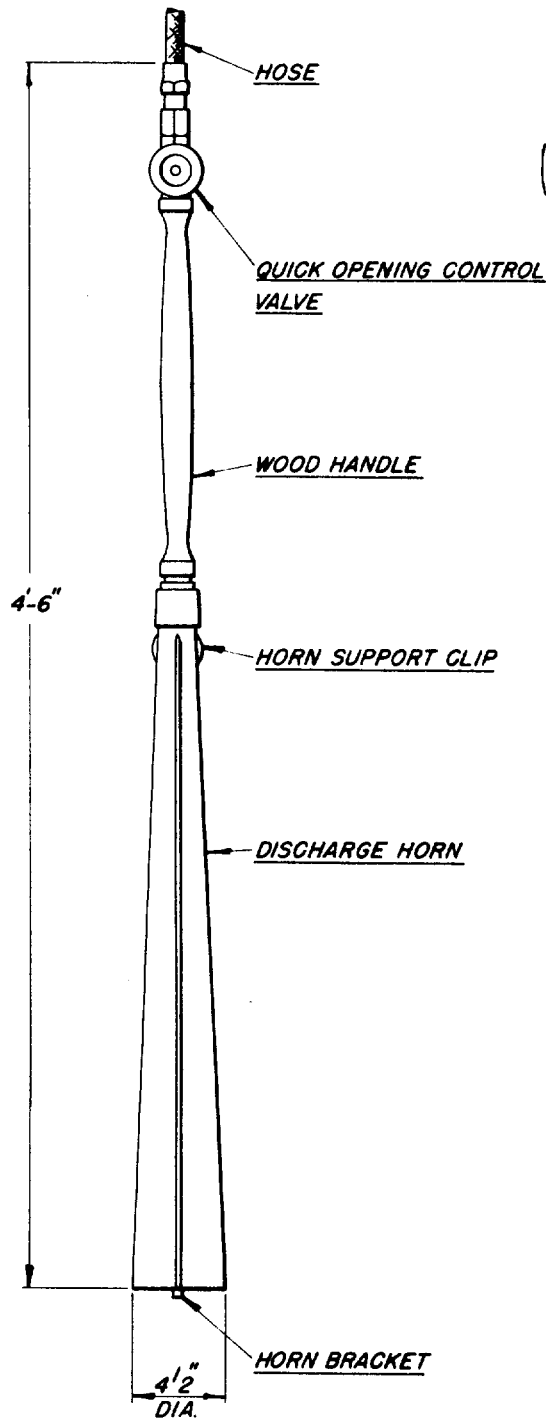
END VIEW

C-O-TWO  
HOSE REEL  
(TRUNION TYPE)

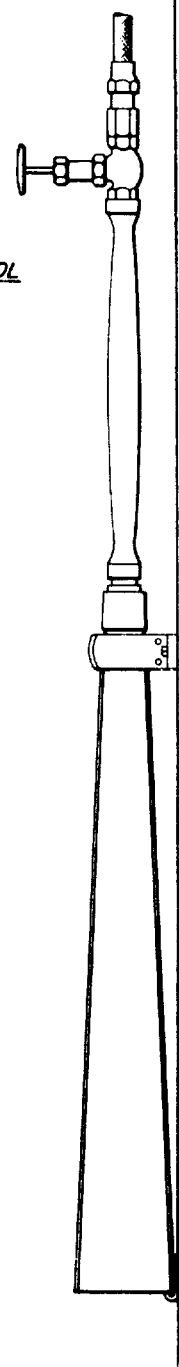
C-70037



DETAIL OF NOZZLE



FRONT VIEW

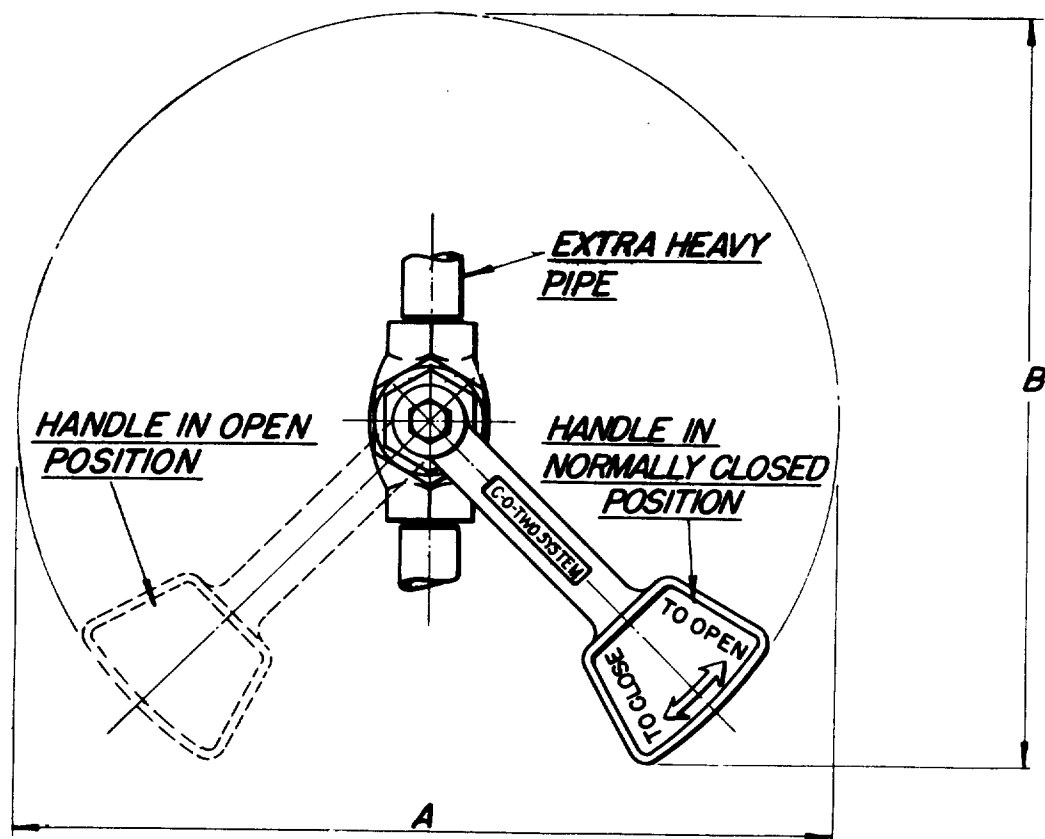


SIDE VIEW

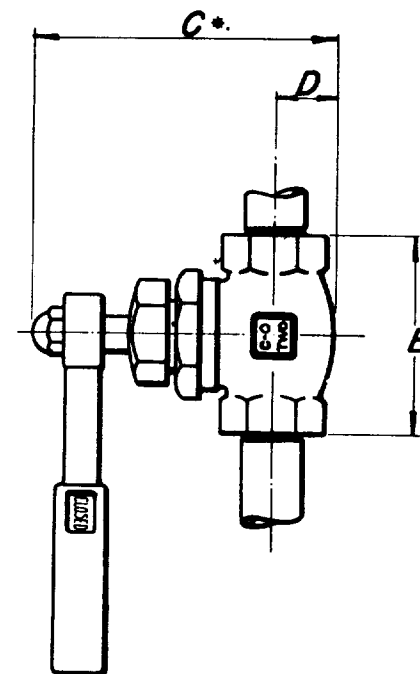
C-O-TWO  
TYPE 50 & 75 DISCHARGE HORN  
WITH CONTROL VALVE

B-70035-1

\* THIS DIMENSION IS WITH VALVE  
IN OPEN POSITION.



FRONT VIEW



SIDE VIEW

VALVE SIZE	A	B	C*	D	E
1/2"	12"	11"	4 3/8"	7/8"	2 5/16"
3/4"	14"	12 3/4"	5 5/8"	1"	3 1/2"
1"	14"	12 3/4"	5 7/8"	1 1/4"	4 1/8"
1 1/4"	14"	12 3/4"	7 1/8"	1 3/8"	4 11/16"
1 1/2"	14"	12 3/4"	7 1/2"	1 5/8"	5 1/4"

C-O-TWO  
MANUALLY OPERATED DIRECTION OR STOP VALVE  
GLOBE TYPE FOR LOCAL CONTROL

B-60241



## Maintenance is simplified with C-O-TWO

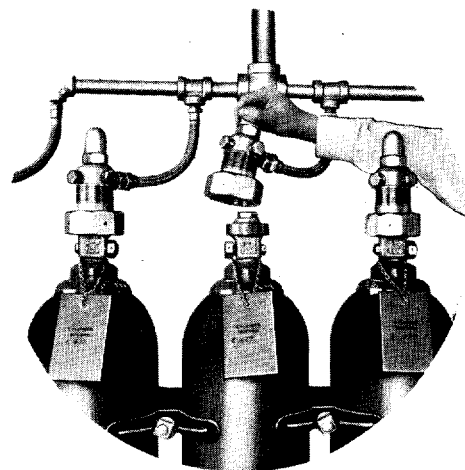
The Annual weight check of cylinders, inspection of discharge heads and control mechanism as prescribed by National Regulations is simplified with C-O-TWO systems. Any cylinder can be removed from a system without disconnecting flexible discharge bends, discharge heads or control mechanism, from permanently installed piping of the system.

To remove any cylinder, unscrew the ring nut coupling connecting discharge head to cylinder valve, then *lift discharge head* off cylinder and the discharge head is held by the flexible discharge bend.

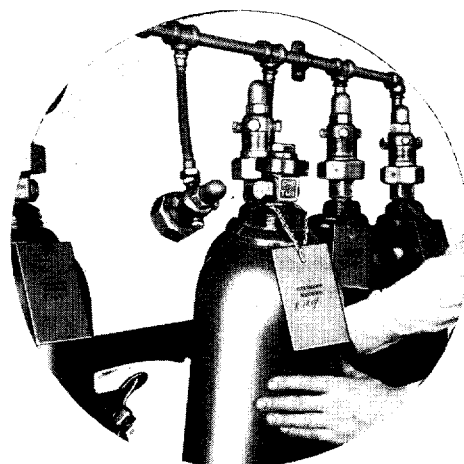
Loosen cylinder clamps of cylinder being inspected, and *pull out cylinder*. Cylinders on either side of the cylinder removed remain firmly bracketed by clamping arrangement.

It is just as important to inspect the cutter or release mechanism of cylinders to see that they are operable, as it is to weigh cylinders to see if they are fully charged.

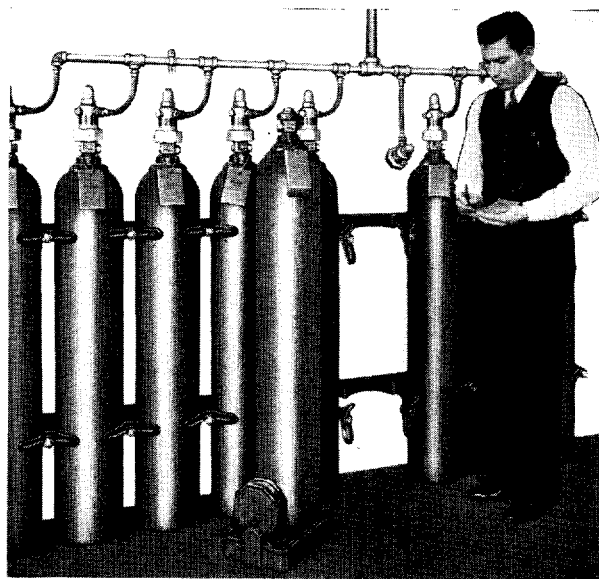
Inspection of C-O-TWO cutters, discharge heads or control mechanism is made with the cylinder removed, which is a special C-O-TWO advantage, and eliminates any possibility of accidental discharge. Should fire occur during this inspection, the system will operate without loss of gas where any cylinder has been removed as the ball check in the discharge head furnishes this safeguard.



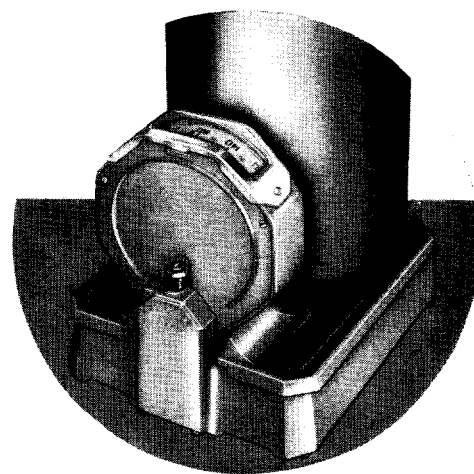
Lift Discharge Head



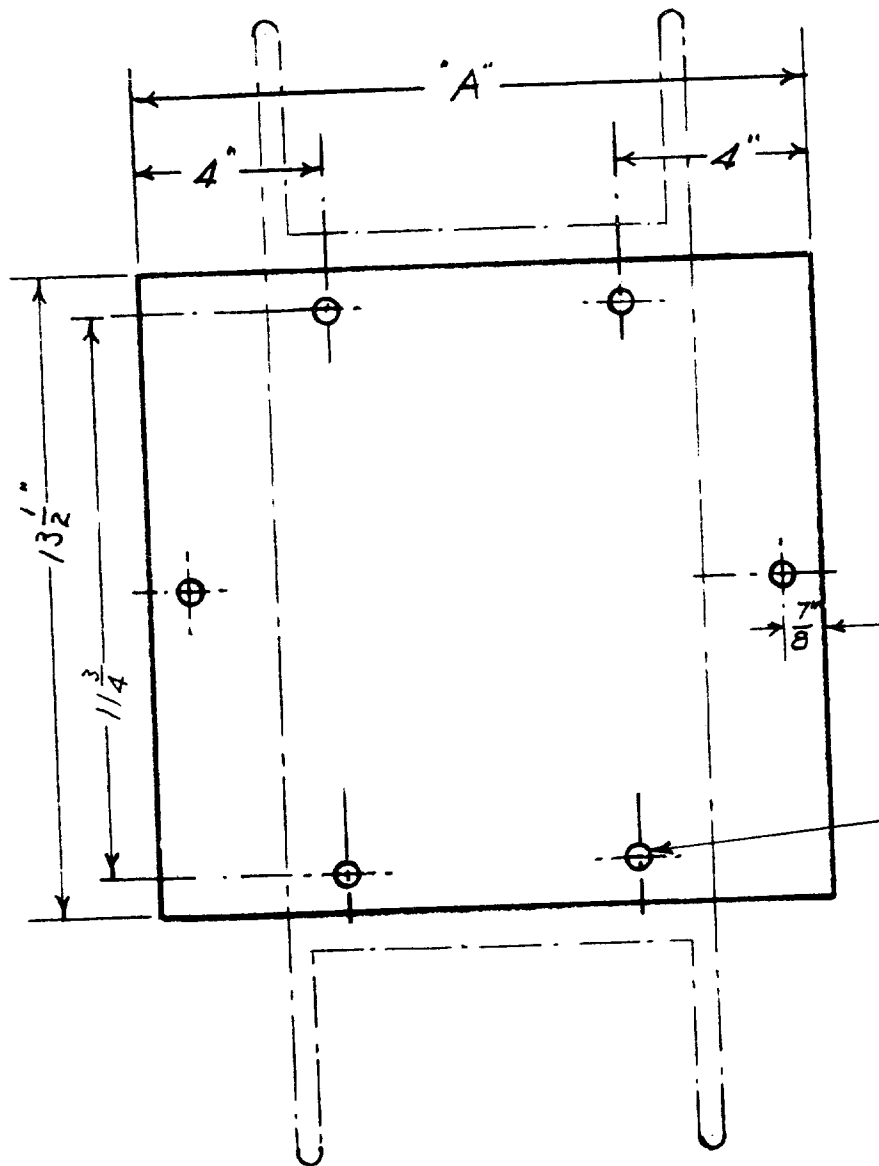
Pull Out Cylinder



Easily Serviced



Accurate Weight



# HOSE REEL WIDTH DIMENSION "A"

0 TO 100 FT. LENGTH 1/2" HOSE - 14 1/4" WIDE
0 TO 50 FT. LENGTH 3/4" HOSE - 14 1/4" WIDE
51 TO 100 FT. LENGTH 3/4" HOSE - 20 1/4" WIDE
101 TO 150 FT. LENGTH 3/4" HOSE - 24 1/4" WIDE
151 TO 200 FT. LENGTH 3/4" HOSE - 26 1/4" WIDE

6 - 1/2" DIA. HOLES - FOR MOUNTING

MOUNTING HOLES IN BACK PLATE			
C-O-TWO HOSE REEL			
C-O-TWO FIRE EQUIPMENT CO.			
PYRENE BUILDING			
560 BELMONT AVENUE			
NEWARK,		NEW JERSEY	
DATE 7-20-39	CHECKED <i>JB</i>	DRAWING NUMBER	
DWN <i>RMT</i>	TR	SCALE 1/4 SIZE	A-60308

## C-O-TWO HOSE SYSTEM

### LOCAL CONTROL TYPE

### OPERATION INSTRUCTIONS

1. To discharge one cylinder, open stop valve above cylinder.
  2. Pull lever on discharge head hard (This fills hose line with carbon dioxide.)
  3. Run discharge horn to fire.
  4. Open valve on discharge horn to release carbon dioxide.
  5. Direct discharge at base of flame.
- Note: If both stop valves are open, discharging one cylinder will simultaneously discharge the other.

### IMPORTANT INSTRUCTIONS

#### A. FLOOR FIRES

Direct discharge first at edge of fire nearest operator. Slowly and deliberately advance, moving discharge horn from side to side as flame is extinguished.  
Be sure all flame is out in part of fire tackled before advancing.

#### B. BILGE FIRES

If necessary to remove floor plates to get at fire, remove as few plates as possible.  
Insert discharge horn in opening and direct gas at nearest edge of fire.  
Continue discharge until all flame is extinguished.

#### C. BULKHEAD OR WALL FIRES

Direct discharge first at bottom of fire. Move discharge horn horizontally back and forth.  
Slowly and deliberately raise discharge horn upward as flame is extinguished. Coat extinguished parts with carbon dioxide snow.

#### D. ELECTRICAL FIRES

Direct discharge at part of unit on fire, using care not to allow metal discharge horn to touch any "live" equipment.  
It is desirable but not always necessary to shut off current before applying gas.  
Always coat extinguished surface with heavy blanket of carbon dioxide snow. Use the complete charge for this purpose.

### GENERAL INSTRUCTIONS

Always continue discharge for a short period after flames are out, holding discharge horn close to smouldering parts and hot materials so as to coat with carbon dioxide snow.

When fire has been completely extinguished without any possibility of re-igniting, open valve on discharge horn and be sure discharge is completely exhausted, before rewinding hose.

When hose reel unit is not in use, always have handle valve in closed position. The closed position is when handle valve is in line with hose and horn.

C-O-TWO SERVICE AND RECHARGING STATIONS

UNITED STATES AND CANADA

Authorized C-O-Two service stations offering  
prompt recharging service.

UNITED STATES

R-1  
RECHARGES  
& SERVICE  
8-18-42

ALABAMA

Birmingham

Crystal Pure Carbonic Inc.  
Mathieson Alkali Works Inc.

Mobile

McGowin-Lyons Hdwe. & Supply

CALIFORNIA

Anaheim

Crystal Chemical Co.

Berkley

Pure Carbonic Inc.

Los Angeles

C-O-Two Fire Equipment Co.  
Liquid Carbonic Corp.  
Pure Carbonic Inc.

San Diego

Nuttall-Styris Co.

San Francisco

C-O-Two Fire Equipment Co.  
Ets-Hokin & Galvan  
Liquid Carbonic Corp.

Wilmington

Ets-Hokin & Galvan

COLORADO

Denver

Hendrie & Bolthoff Mfg. & Sup.  
Liquid Carbonic Corp.

Grand Junction

Clinton A. Biggs

CONNECTICUT

Hartford

Hartford Fire Extinguisher Co.  
L.L. Ensworth & Son Inc.

New Haven

Mackenzie Mach. & Marine Wks.

New London

Auto & Marine Electric Serv.

Stratford

Connecticut Fire Equip. Co.

DIST. OF COLUMBIA

Washington

Mathieson Alkali Works, Inc.  
National Equip. & Supply  
Shirley, Olcott & Nichols  
Southern Oxygen Co.

FLORIDA

Jacksonville

Mathieson Alkali Works Inc.  
Georgia Supply Co.  
Liquid Carbonic Corp.  
Pure Carbonic Inc.

Miami

Hopkins-Carter Hdwe. Co.

West Palm Beach

W.H. Ligenfelter

GEORGIA

Atlanta

C-O-Two Fire Equipment Co.  
Crystal Pure Carbonic Inc.  
Liquid Carbonic Corp.  
Mathieson Alkali Works

Savannah

Georgia Supply Co.

IDAHO

Boise

Sanderson Safety Supply Co.

ILLINOIS

Chicago

C-O-Two Fire Equipment Co.  
Liquid Carbonic Co.  
Pure Carbonic Inc.

Peoria

Couch & Heyle Inc.  
Liquid Carbonic Corp.

C-O-TWO SERVICE AND RECHARGING STATIONS

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RECHARGES  
& SERVICE  
8-18-42

INDIANA

Indianapolis

Liquid Carbonic Corp.

IOWA

Des Moines

John Z. Beamer

Globe Machinery Co.

Fessler Coil Cleaning Co.

KANSAS

Wichita

The Motor Equipment Co.

KENTUCKY

Louisville

Liquid Carbonic Corp.

Pure Carbonic Inc.

Tafel Electric Co.

Neill LaVielle Supply Co.

LOUISIANA

New Orleans

Mathieson Alkali Works Inc.

Liquid Carbonic Inc.

Pure Carbonic Inc.

Woodward, Wight & Co. Ltd.

Shreveport

Pelican Well Tool Supply

MAINE

Portland

Eastern Fire Equipment Co.

MARYLAND

Baltimore

Wm. H. Whiting Co.

Mathieson Alkali Works Inc.

Curtis Bay

U.S. Industrial Alcohol Co.

MASSACHUSETTS

Boston

American Fire Equip. Co.

The Evans Mill Supply Co.

Walter H. Moreton Corp.

Cambridge

Liquid Carbonic Corp.

Everett

Pure Carbonic Inc.

MASSACHUSETTS

Gloucester

Cape Ann Fire Appliance &  
Recharging Service

New Bedford

E. F. Dahill Co.

Springfield

Massachusetts Fire Equip. Co.

MICHIGAN

Detroit

The Boyer-Campbell Co.

Liquid Carbonic Corp.

Pure Carbonic Inc.

Henry H. Smith Co.

MINNESOTA

Duluth

Kelly-How-Thomson Co.

Minneapolis

W. S. Nott Co.

Liquid Carbonic Corp.

Pure Carbonic Inc.

St. Paul

Sanderson Fire Equip. Co.

MISSOURI

Kansas City

Liquid Carbonic Corp.

Pure Carbonic Inc.

St. Louis

Liquid Carbonic Corp.

Pure Carbonic Inc.

NEBRASKA

Omaha

Andersen Company Inc.

NEVADA

Reno

Nevada Fire Extinguisher  
Service

Sparks

Nevada Fire Extinguisher  
Service

NEW JERSEY

Harrison

American Carbonic Co.

C-O-TWO SERVICE AND RECHARGING STATIONS

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RECHARGES  
& SERVICE  
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NEW JERSEY

Lakewood  
Wallace Bros.  
Newark  
C-O-Two Fire Equipment Co.  
Pure Carbonic Inc.  
Plainfield  
Approved Fire Protection  
Rahway  
Acme-Baldwin Fire Prevention Co.  
Trenton  
Warren-Balderston & Co.

NEW YORK

Albany  
Liquid Carbonic Corp.  
Sager Spuck Supply Co.  
Brooklyn  
Pulmosan Safety Equip. Co.  
Buffalo  
Liquid Carbonic Corp.  
Pure Carbonic Inc.  
Root-Neal & Co.  
Coram  
Municipal Machinery Co.  
Long Island City  
Liquid Carbonic Corp.  
Newburgh  
Newburgh Oxygen Service  
New York City  
Smith Meeker & Co.  
Pure Carbonic Inc.  
Patchogue  
C. E. Alexander  
Rochester  
Cook Iron Store Co.  
Rockville Center L.I.  
Advanced Safety & Fire Equip. Co.  
Syracuse  
Syracuse Supply Co.

NORTH CAROLINA

Charlotte  
Crystal Pure Carbonic Inc.  
Mathieson Alkali Works  
Greensboro  
Mathieson Alkali Works

OHIO

Akron  
M. F. Murdock Co.

OHIO

Cincinnati  
Scallon Supply Co.  
Liquid Carbonic Corp.  
Pure Carbonic Inc.  
Queen-City Supply Co.  
Sparkling Carbonic Co.  
Cleveland  
Fire Extinguisher Service  
Liquid Carbonic Corp.  
J. F. Schuerger Co.  
Columbus  
The Ross-Willoughby Co.

OKLAHOMA

Oklahoma City  
Mideke Supply Co.  
Tulsa  
Carbonic Products  
Marshall Equip. & Supply Co.

OREGON

Portland  
American Extinguisher & Sup.  
Pure Carbonic Inc.

PENNSYLVANIA

Erie  
H. P. Weller Supply Co.  
Philadelphia  
James M. Castle Inc.  
Henschel Corp.  
Liquid Carbonic Corp.  
Pure Carbonic Inc.  
Pittsburgh  
Liquid Carbonic Corp.  
Pure Carbonic Inc.  
Standard Machinists Supply

RHODE ISLAND

Providence  
Combination Ladder Co. Inc.

TENNESSEE

Knoxville  
E. N. Harrison Co.  
Memphis  
Mathieson Alkali Works  
Crystal Pure Carbonic Inc.  
Liquid Carbonic Corp.

C-O-TWO SERVICE AND RECHARGING STATIONS

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TENNESSEE

Nashville

Buford Brothers  
Mathieson Alkali Works

TERRITORY OF HAWAII

Honolulu

Hawaiian Gas Products Ltd.

TEXAS

Amarillo

Clowe & Cowan Inc.

Corpus Christi

San Antonio Machine & Supply

Dallas

O. D. Buford Co.

Crystal Pure Carbonic Inc.

Liquid Carbonic Corp.

El Paso

Carbonic Gas & Supply Co.

Houston

Butler Fire Equipment Co.

Liquid Carbonic Corp.

Orange

Sabine Supply Co.

San Antonio

Liquid Carbonic Corp.

San Antonio Machine & Sup.

Witt Ice & Gas Co.

UTAH

Price

Carbon Dioxide & Chemical Co.

Salt Lake City

Carbo Chemical Co.

Salt Lake Hdwe. Co.

CANADA

ALBERTA

Calgary

Canadian Carbonate Co.

Edmonton

Liquid Carbonic Canadian Co.

BRITISH COLUMBIA

Vancouver

Hoffars Ltd.

Liquid Carbonic Canadian Co.

MANITOBA

Winnepeg

Liquid Carbonic Canadian Co.

VIRGINIA

Norfolk

Mathieson Alkali Works

Curtis Marine Co. Inc.

Liquid Carbonic Corp.

Richmond

Curtis Marine Co. Inc.

WASHINGTON

Seattle

Liquid Carbonic Corp.

Pacific Marine Supply Co.

Sanderson Safety Supply Co.

Spokane

Sanderson Safety Supply Co.

WEST VIRGINIA

Huntington

C. W. Hutchinson Inc.

WISCONSIN

Milwaukee

J. Pritzlaff Hdwe. Co.

Milwaukee Brewers Spec. Co.

Richard J. White, Jr.

NOVA SCOTIA

Halifax

Canadian Carbonate Co.

Liquid Carbonic Canadian Co.

ONTARIO

Hamilton

Canadian Carbonate Co.

Dominion Carbonic Co.

Toronto

C-O-Two Fire Equipment Co.  
of Canada, Ltd.

QUEBEC

Montreal

Liquid Carbonic Canadian Co.



C-0-TWO SYSTEM - REMOTE CONTROL TYPEMAINTENANCE INSTRUCTIONS

After the system has been installed six months, and every six months thereafter, the following inspection should be made:

1. CHECK WEIGHT OF EACH CYLINDER.

- A. Remove levers on discharge heads of control cylinders by removing lever pins--Do not disconnect cable from lever or replace levers until all inspections have been completed.
- B. Unscrew coupling nut connecting the discharge head to cylinder valve and then lift head off cylinder. See that cutter is in uppermost position and in good condition.
- C. Loosen cylinder clamps of cylinder being inspected and pull out cylinder for weight check. If total weight of cylinder is less than the full weight stamped on cylinder check the loss of weight in following table. If the loss of weight is greater than that shown below, recharge cylinder immediately.

Cylinder size	10	15	20	25	35	50	75	100
Allowable loss in pounds	1	1.5	2	2.5	3.5	5	7.5	10

- D. Replace cylinder being inspected and attach discharge head hand tight only. Remove only one cylinder at a time for weight check.

2. TEST REMOTE PULL CONTROL.

- A. Make sure levers have not been replaced on discharge heads of cylinders.
- B. Open pull box and pull handle to see that cable in conduit has a free movement.
- C. Return cable to reset position and close pull box.
- D. Replace levers in reset position and discharge heads of control cylinders.

3. INSPECT PIPING TO SEE THAT PIPING AND DISCHARGE NOZZLES ARE IN GOOD CONDITION AND SECURELY BRACKETED.

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Protect cylinders from corrosion by keeping them well painted at all times.

When necessary to refill cylinder, attach protection cover to cylinder valves and return to manufacturer, nearest agent, or to nearest carbon dioxide manufacturer's recharging plant.

SHOULD FIRE OCCUR WITH ANY SINGLE CYLINDER REMOVED FROM A MULTIPLE CYLINDER SYSTEM DURING WEIGHT INSPECTION OF CYLINDERS, THE SYSTEM CAN BE USED WITHOUT LOSS OF GAS. THE BALL CHECK IN THE DISCHARGE HEAD PROVIDES THIS SAFEGUARD.

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